SEPTEMBER 1957

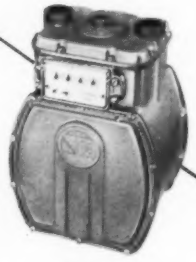
GAS

COMPUTING-TELEMETERING SYSTEMS

A CHILTON PUBLICATION

ENGINEERING • UTILIZATION • PIPELINES • MANAGEMENT

New slow-speed AL-250 ALUMINUMCASE METER... for sustained accuracy



MODEL AL-250 ALUMINUMCASE
Rated capacity 250 cfh of 0.64 sp. gr. gas at ½-inch w.c. differential—5 psi working pressure.

The new American® AL-250 Aluminumcase Meter operates at only 7 revolutions per cubic foot providing proven tin meter accuracy possibilities through greater power and slow-speed operation.

Every field-proven design feature pioneered by American is incorporated including oil impregnated porous bronze bearings, internal rubber grommet seals . . . PLUS

- **AMPLE POWER**—with large, 3-convolution molded Duramic diaphragms for all fuel gas services.
- **FLAG RODS**—heavier, reinforced construction.
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- **DIE CAST METER CONNECTION THREADS**—minimize galling.
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INCORPORATED (ESTABLISHED 1836)

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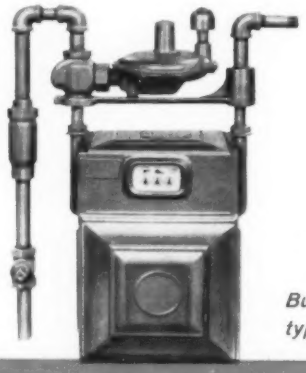

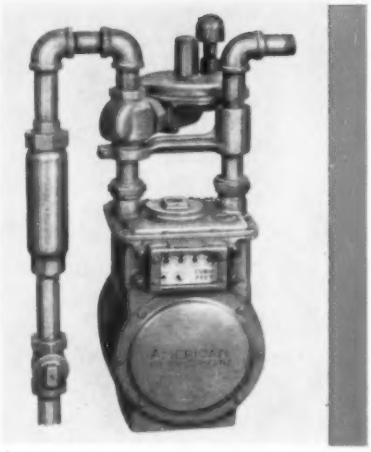

▲ *Iron Case Meter with filter-regulator and meter bar.*

◀ *Tinned Steel Case Meter with filter-regulator and meter bar.*

Bulletins are available on all types of Reliance Regulators

AMERICAN® METER COMPANY
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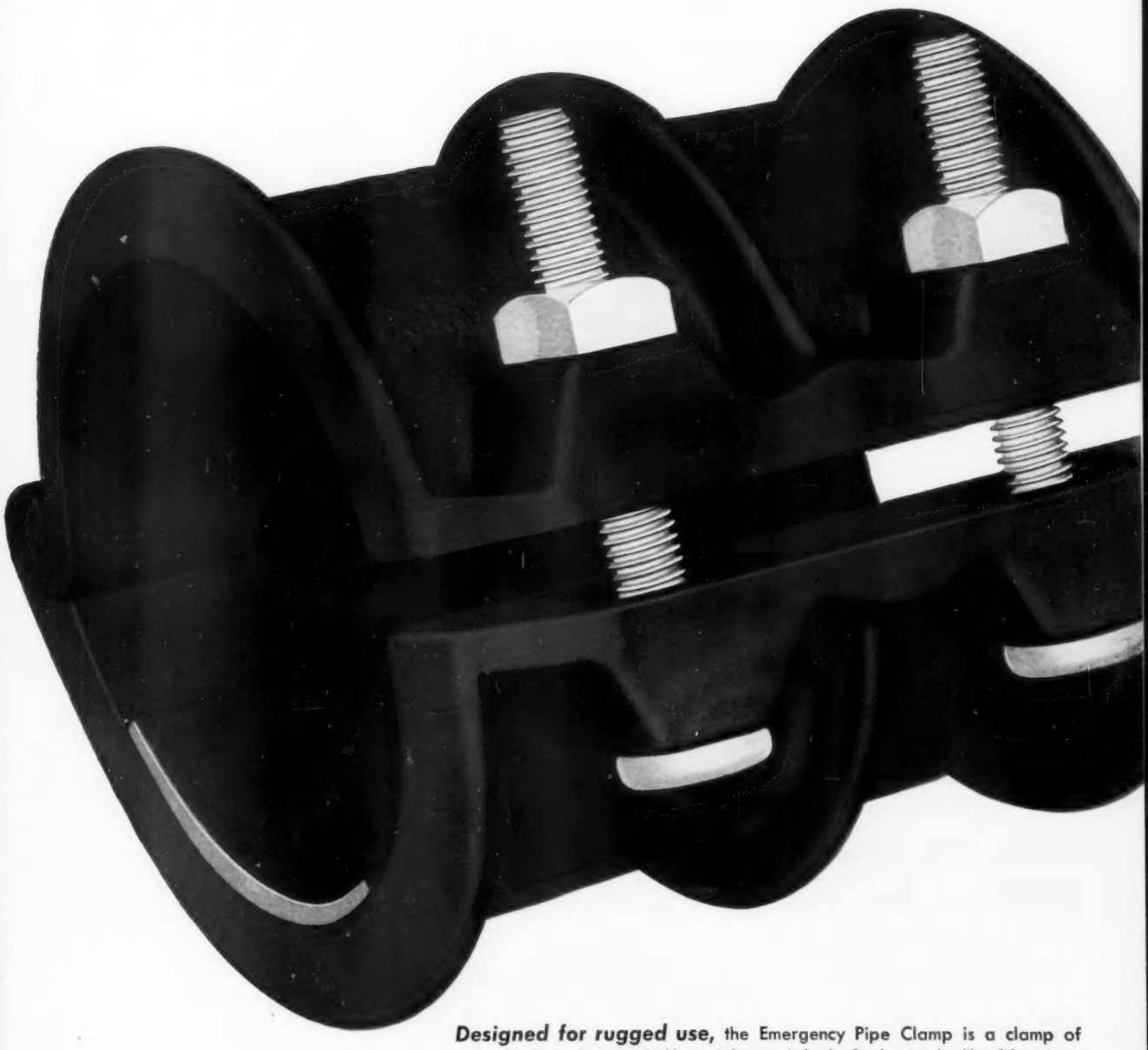
RELIANCE REGULATOR DIVISION
ALHAMBRA, CALIFORNIA

THE CLAMP WITH GUTS!



Designed for rugged use, the Emergency Pipe Clamp is a clamp of almost unlimited strength. You might say it looks fairly simple. Yet fifty years of experience have gone into its design . . . the heavy ribbing to "take" the bolt-pull, the skillful shaping of the bolt lugs for terrific strength and a free wrench swing. The full length, massive hinge which no strain can loosen! The over-thickness of metal throughout to make child's play of any pressure! The glove-like fit . . . result of shaping each clamp over an accurate mandrel, pulling it down with a 12,000 pound air vice and sledging to complete snugness.

When you put on the Emergency Pipe Clamp, it is there to stay. Tens of thousands of them are still in place after 20, 30, 40 years' service. Made in C.I. and steel pipe sizes—½" to 12" inclusive.

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SKINNER-SEAL **EMERGENCY PIPE CLAMP**

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BPA

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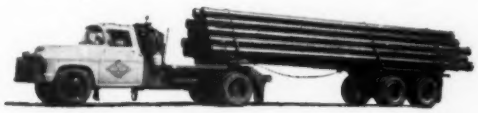

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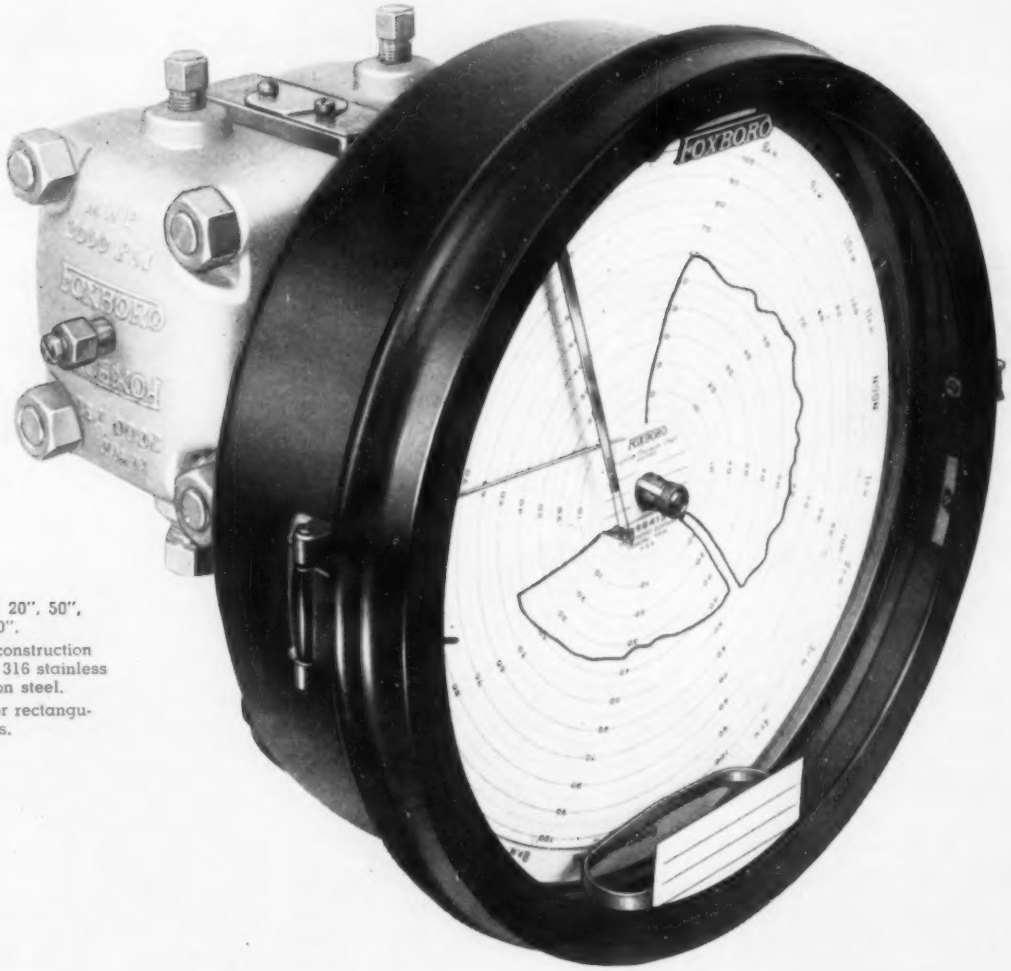

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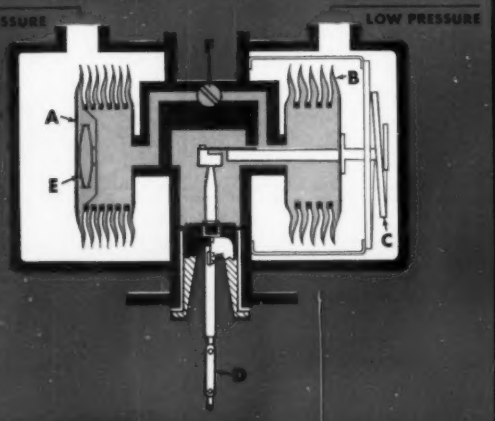
In schematic drawing at right, areas shown in color represent a stable, non-freezing liquid. Any pressure increase in the high pressure chamber compresses Diaphragm Unit A, displacing its liquid and expanding Diaphragm Unit B until force of Range Spring C equals the difference between the forces on Diaphragm Units A and B. Linear motion of Diaphragm Unit B moves inner end of Drive Bar D — outer end moves correspondingly through the bellows-sealed flexure bar, driving pen arm. Built-in Temperature Compensator (E) proportionately adjusts diaphragm capacity as ambient temperature variations affect volume of filling fluid. External damping adjustment is shown at F.



• *complete overrange protection!*

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Now you can have mercuryless flow measurement for a wide range of differential pressures — at static pressures up to 2000 psi — with greater safety and dependability than ever before! The new Foxboro Type 37 Diaphragm Meter not only combines unmatched ruggedness and precision in a dry meter — it's by far the easiest to adjust and maintain. And it does away with zero drift problems, once and for all! Expansible, Type 316 S.S. diaphragm elements respond to changes in pressure with unmatched sensitivity, yet are completely immune to overrange up to full static pressure! A unique packless drive bar precisely transmits linear motion to the pen arm. Range-changing is easy, due to new twin-spiral spring design. Wide range damping is externally adjustable under pressure. And the Type 37 is self-compensating for temperature changes in all differential ranges. Get full details on this high utility, completely dependable dry flow meter. Arrange for a demonstration with your nearby Foxboro Field Engineer, or write **The Foxboro Company, 359 Norfolk St., Foxboro, Mass., U.S.A.**

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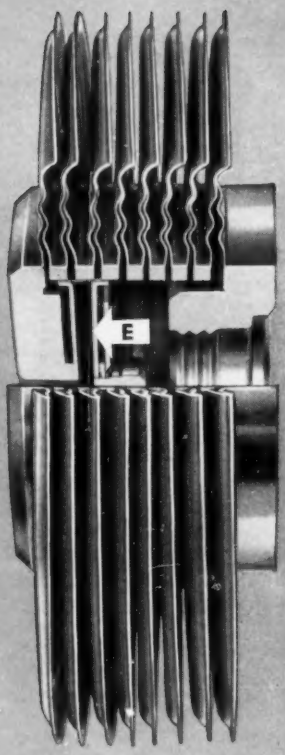
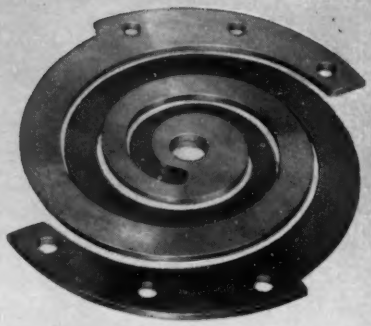


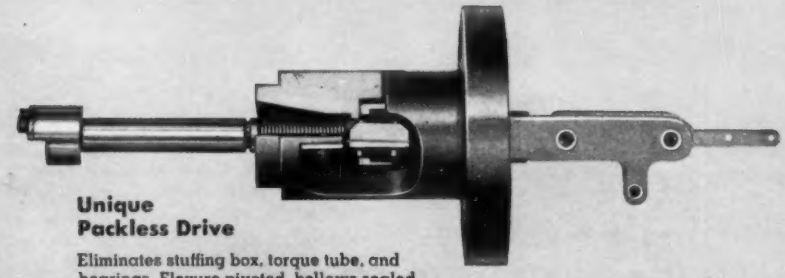
Exclusive Diaphragm Elements

Type 316 S.S. diaphragm units in both high and low pressure chambers provide greatest linearity and freedom from hysteresis; nesting design and integral spacer rings provide safe, positive, overrange protection. Temperature compensation (E) is built into diaphragm assembly . . . never requires change or adjustment.



Exclusive Range Springs

Heavy gauge Ni-Span C alloy, twin-spiral springs provide high sensitivity with lasting accuracy. Readily accessible . . . range changes are easily made, in minutes!



Unique Packless Drive

Eliminates stuffing box, torque tube, and bearings. Flexure-pivoted, bellows-sealed drive bar transmits diaphragm's linear motion to the pen arm with unequalled sensitivity *and undiminished* power. Seal for flexure pivot is a tough, flexible bellows.

GAS Thermally Thinking

HAVING just moved into another new home out here in California, a few of my pet peeves have been encountered again. But I know from my travels that I am not the only one who runs into these problems when trying to use convenient, safe, economical gas appliances. I have learned that the situation is pretty general.

First, we found a house my wife could live with—I can live with just about any of them. It was new and completely equipped with electric built-ins in the kitchen. Out they came and in went gas. But before this, I asked the builder why he had made such an unfortunate choice in the first place. His answer: "The wives actually 'buy' the fine (his words) homes I build, and they like electric cooking these days." Further conversation with him revealed that he didn't care what type of kitchen appliances went in. He builds and sells houses. The future owners can cook with gas, electricity, radar waves or dried camel dung, it was all the same to him. His approach, just analyze the trend and build his houses with the current trend built-in.

Next we encountered the super-sonic color barrier. The simple sonic barrier is easily broken. Jets do it right over the subject house all the time as numerous sonic-booms will testify. But, have you ever tried to break the appliance color barrier? It can't be done. We wound up with a mad mauve dish washer, desert sand ovens and top burner range section, and a very suspiciously colored Servel. They don't exactly blend, but you don't notice it from a galloping horse.

And there was no gas piping for the Servel. So, while we were having that put in—at slight extra cost—we thought we might as well have a gas line installed to connect the clothes dryer. They are handy, even in California. Just a few bucks more were involved here. So we thought we were pretty well set. The water heater and forced-air central unit both seemed able to get gas. But, then we saw that two-dollar thermostat.

It was a good thermostat. But it didn't have a night turn-down on it. And to me you just don't have a comfort heating system without that feature. I simply don't pretend to like bailing out of bed at some impossible hour to turn the heat up to have the house warm by seven. And, we don't like to sleep in an oven, either. Actually, it didn't make much difference because the heating unit wouldn't work anyway.

So here we have the same old problems of our industry turning up year after year. They are not directly attributable to the gas companies. But they reflect on them just the same. How can our industry get to these builders, subcontractors, plumbers and heating "experts"? It becomes more obvious (with every move the Ebdons make) that all of the gas companies do not have the answer yet.

We are just ornery enough to find out. Watch the coming issues of GAS.

J. Fred Ebdon

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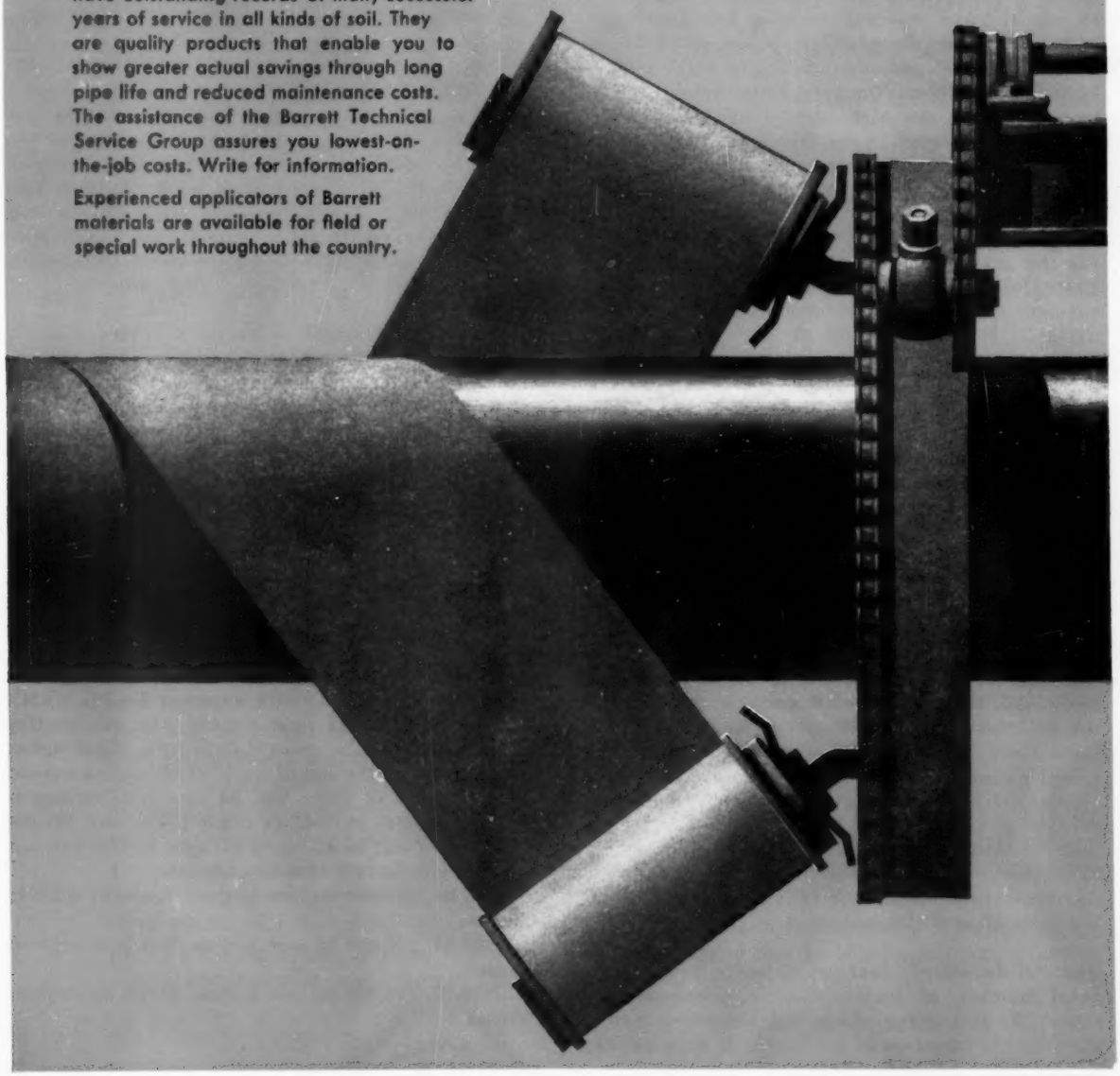

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Allied Chemical

OVER 100 YEARS OF EXPERIENCE

GAS highlights

SEPTEMBER 1957

SPOT NEWS, TRENDS, COMMENT ON GAS INDUSTRY AFFAIRS

With steel prices up again, high interest rates required to produce new debt capital, and large blocks of natural gas reserves (needed for appreciable expansion) bringing premium prices, some of the more fully developed—mature, if you will—gas systems find the "bloom" is gone from the natural gas business. With the high cost of expansion and a matured rate structure, further expansion does not do anything for earnings on common shares. But, the less mature companies taking gas to less competitive (with other fuels) areas and to areas where there are actual projected gas supply shortages, are making the gas industry on the whole very promising. Profits will be more elusive and there will be more variance from company to company in the future.

Columbia Gas System plans to start recovery of petrochemical fluids from wet Appalachian gas produced and purchased in Kentucky and West Virginia. An extraction plant and a fractionation plant will be constructed. A pipeline will be built to move mixed liquid hydrocarbons between the two. Cost of the facilities is pegged at $13 million. The extraction plant will go in at Kenova, W. Va. and will be owned-operated by United Fuel Gas Co. Fractionation plant and storage facilities will be at Siloam, Ky.

Lone Star Gas Co. (Dallas) has succeeded after two years of discussions and conferences in enlightening city representatives, architects, mechanical engineers, etc., that gas can do it better and cheaper as the fuel for air conditioning and heating the new Love Field Terminal. The world's most air conditioned airport will be cooled by two 600-ton, steam turbine-driven, centrifugal refrigeration machines—producing 1200 tons of refrigeration. From front door to loading ramp, natural gas will provide a comfortable, man-made climate throughout the year. Gas-fired steam-turbine air conditioning is building big loads all over the southwest.

The "Midwestern" hearing—actually involving a great number of major pipeline companies and others—is still going along, but Examiner Hall is showing his intention of not letting it drag out any more than is possible. Recently, Hall stated to a session just before ending for the day: "I have been listening quite carefully to cross examination in the last few days, and I am convinced that many questions are being asked in this proceeding that need not be asked and that do not develop anything; and as I said a while ago, the commission is going to have to deal with this matter. In this proceeding I am not going to wait for the commission to deal with this matter because I can deal with it myself and if I at any time feel that anybody is unduly extending cross examination or by any other means causing this hearing to be extended, I am simply going to extend the hours of the day, and Mr. McGrath (Counsel on behalf of the coal and labor interests. Ed.), if you feel that you have to ask questions, we will just give you all the time that you want, but this hearing is not going to be extended unduly." Examiner Hall then made it plain that Counsel McGrath and associates were not the only ones that have been going beyond what he considers reasonable cross examination and mentioned that the staff had been doing the same thing recently.

A bright development at Northern Illinois Gas Co. (Aurora, Ill.) is authorization to proceed with installation of gas space heating service to an additional 30,000 homes. At the beginning of 1957, prospects for connecting additional heating applicants on a waiting list were not good. But gas supply factors improved enough to permit the large addition. Even with this addition, however, Northern Illinois does not consider the situation healthy as it still has a backlog of 110,000 eligible consumers waiting for gas heating service. The company is not letting any slack develop in its efforts to wipe out this waiting list.

On the West Coast, domestic space heating with natural gas is growing with leaps and bounds. GAMA surveys indicate at least 658,000 new gas heating installations will be made in California, Washington, and Oregon by the end of the 1959-60 heating season. About 85,000 of these will be new installations in existing homes to replace other fuels, and 573,000 new homes will be equipped for gas comfort heating. Breaking it down by heating seasons:

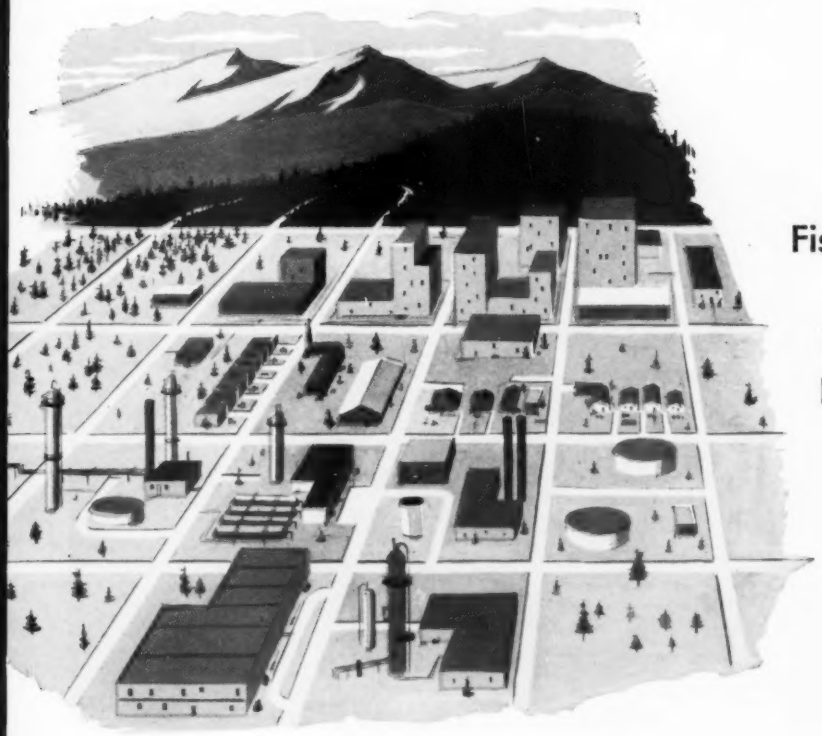
1957-58, 192,000 in new homes, 30,000 in existing homes.

1958-59, 192,000 in new homes, 28,000 in existing homes.

1959-60, 198,000 in new homes, 27,000 in existing homes.

Natural gas companies serving the Pittsburgh area (The Peoples Natural Gas Co. in the forefront) zipped up normally dull summer television with a new night time program, the "Silent Service"—a submariners' version of "Victory at Sea" and "Crusade in Europe." This moving TV drama is a high point in the re-run bill of fare served up during the summer. A fine spot to tell the public about gas service and appliances.

how Fish Service Corporation helped bring a new age of energy to SPOKANE



From initial Survey to final completion Fish Service Corporation supervised all steps in converting Spokane Natural Gas Company from an obsolete Propane-air utility to a modern, efficient natural gas distributing system.

IN EARLY 1953 Spokane Gas and Fuel Company saw little hope for the future. Sales were declining, the system was obsolete, cash was low, and prospects were so dim new financing was hard to get.

Then, with the promise of Natural Gas via pipeline from the San Juan Basin, things began to look up. But the company had little experience in planning, financing and executing the modernization required to take advantage of the new supply.

The management then turned to experts. Fish Service Corporation was retained to take charge of all phases of the change.

First Fish made a survey. Then, based on that survey, new financing was obtained. On behalf of the company, Fish went before the state regulatory commission and the F.P.C. The system was modernized and enlarged with supervision and inspection by Fish. Rate structures were calculated by Fish, and the company organization was improved. Even the name was changed to the Spokane Natural Gas Company.

Results were gratifying. Demand went up immediately. By December 1957, demand is expected to reach a peak of 37 million cubic feet per day. A sick, declining company had been transformed to a vigorous, growing one.

This may be an extreme example, but Fish Service Corporation may be able to help you, too. Why not call us and find out.

FISH SERVICE CORPORATION

HOUSTON, TEXAS

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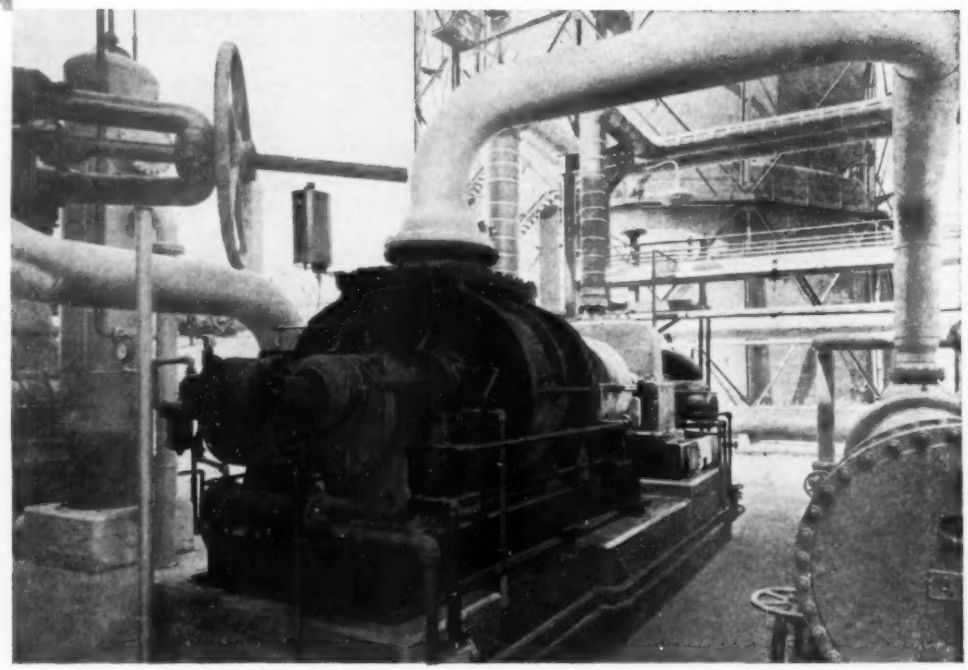
SERVICE CORPORATION

MATHIESON

For Olin Mathieson



R-C pumps and blowers control air and gas mixing

In the manufacture of ammonia at this large Olin Mathieson chemical plant at Lake Charles, Louisiana, large volumes of hydrogen, nitrogen and air are positively proportioned and compressed by Roots-Connersville equipment.

R-C Gas Pumps are teamed with Rotary Positive Blowers to handle pure hydrogen gas and air for processing into a 3:1 hydrogen-nitrogen synthesis. Another R-C Gas Pump compresses this mixture to supercharge other equipment.

Inherently high efficiency of the famous R-C rotary positive design, extremely low friction loss and extra deep stuffing boxes are a few of the reasons why this equipment delivers maximum performance within rated capacities.

Here is another example of the widespread application of R-C equipment in the process industries. If you have a product or a process requiring handling and accurate control of air or gas, Roots-Connersville engineers will welcome the opportunity to give you the benefit of their long experience. Address your inquiry to Product Development Manager.

R-C Rotary Positive Equipment purchased for this installation

22 x 29 Gas Pump rated 4975 cfm, 514 rpm, 425 Hp

14 x 28 Gas Pump rated 4250 cfm, 830 rpm, 112 Hp

10 x 18½ Blower rated 1770 cfm, 830 rpm, 37.6 Hp

The 14 x 28 Gas Pump and 10 x 18½ Blower are direct-driven in a single assembly.

The 22 x 29 Gas Pump functions as a supercharger for the 3:1 hydrogen in nitrogen gas mixture.

ROOTS-CONNERSVILLE BLOWER

A DIVISION OF DRESSER INDUSTRIES, INC.

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Engineers – unusual career opportunities await you at Roots-Connersville. Address your resume to Professional Employment Manager.

*regulatory and legislative trends

Florida's gas and growing pains

FLORIDA will be the last region in the United States to obtain the benefits of natural gas service. The Federal Power Commission in authorizing a 1500-mile pipeline from Texas to Miami analyzed Florida's gas pains along with its growing pains thus:

"The introduction of natural gas, in addition to making available to consumers in Florida the usual benefits of natural gas of cleanliness, convenience and economy, would provide a second source of fuel to help forestall any possible emergency shortage, would give rise to greater fuel competition in the state with its attendant public advantages, would aid in the economic development of the state by stimulating industry and otherwise, and would help meet the growing fuel demands of the burgeoning Florida population."

The FPC listed the proof necessary before a permit to build an interstate natural gas pipeline will be granted. The requirements are (1) an adequate gas supply for maximum delivery over a long period of time, (2) ample markets to buy the transported gas in competition with alternate fuels, (3) pipeline facilities which are reasonable and feasible from the standpoint of cost and engineering design, (4) workable and proper financing, and (5) the economic feasibility of the project, which means revenues sufficient to pay operating expenses, depreciation and taxes plus a fair return on the money invested.

Unique conditions in Florida

The unique conditions in Florida and the nature of the need for natural gas substantially increase the difficulties of planning a pipeline. Florida's climate is mild, and the utilization of the maximum capacity of any pipeline supplying gas to Florida markets would be relatively low. The percentage requirement for natural gas for domestic and general service purposes would be low. A large part of the Florida market would be industrial sales in direct competition with other fuels.

The commission said that the large proportion of gas to be used for boiler fuel in generating electricity is inherent in the initial stages of any proposal to supply natural gas to Florida.

Gas supply

The commission found that the joint project has an adequate gas supply with many 20-year gas purchase contracts from producers. The resale requirements of 100 MMcf daily would be available for at least 17 years. The boiler fuel gas to be transported from the gas fields to the Florida steam plants would be available to meet the fuel requirements of 150 MMcf daily for at least 16 years. The commission found that the available supply of gas was sufficient to support the project and to meet the demands of the markets.

Classes of customers

The commission was convinced of the public demand and need for gas in Florida. Three categories of service were proposed to consumers in Florida. The classes were (1) the sale of natural gas for retail distribution by gas distributors, (2) the direct sale of natural gas by the pipeline to industrial customers, and (3) the transportation service to the steam plants of the two electric companies serving Florida.

Considering the annual volumes of gas to be sold, the sales would be 21 per cent to the local distributing companies for firm retail, 10 per cent for interruptible retail, then 10 per cent for direct interruptible industrial sales, and 59 per cent for transportation service of boiler fuel.

The FPC considered the interests of competitors. The distinctive market conditions which justified authorizing the use of large volumes of gas for boiler fuel were controlling. The commission concluded that although the sellers of liquefied petroleum gas in Florida may suffer economic losses initially, the increased industrial activity resulting from the introduction of natural gas will yield offsetting benefits in the long run.

A monthly commentary on national and state developments by an expert in the field of utility law.

Regulatory trends . . . Pending appeal has slight chance of success

Cost of facilities and financing

The interconnected pipeline project embraces 414 miles of Texas gathering lines, 1500 miles of main pipeline, and 682 miles of lateral lines to 84 communities and industrial customers in Florida. The total cost of the project is about $180 million.

The FPC's principal concern was with the financing rather than with the engineering design of the facilities. The certificate was conditioned by the commission to require that 15 per cent of the financing be accomplished by common stock equity, and that bonded indebtedness be no greater than 75 per cent of total capitalization, with the remainder in short term loans. The FPC is concerned when such a large portion of the income of the pipeline companies is spent for debt payments, which leaves very little margin for times when economic conditions are less favorable.

Economic feasibility

To make the project economically feasible, the FPC attached conditions to the certificate authorizing construction of the pipeline. The FPC found that the key to the proposal involved the transportation of 150 MMcf daily of gas for the electric companies' steam plants in Florida. The FPC found this case unique, and permitted a departure in this case from the standards applied in former cases in determining whether to approve boiler fuel sales. The commission added that the evidence supports the conclusion that when the pipeline service develops, the proportionate part of its sales devoted to uses which more fully employ the distinctive potentials of natural gas will increase.

The gas transportation arrangement was based upon a proposed rate determined on the comparison with the price of competitive fuel oil. The commission found that price to be at least $1 million a year below the cost of rendering the transportation service. The resulting subsidy by other customers to the transported boiler fuel gas was rejected by FPC and the certificate was conditioned upon the transportation rate being self-supporting. FPC also required that the over-all revenues of the interconnected pipeline project be sufficient to produce a 6 per cent rate of return on the investment.

The FPC found another defect in the transportation arrangement with the electric companies which permitted them to cancel or reduce their purchase of gas if competitive fuel oil became cheaper. The commission stated that operation of those provisions could leave the pipeline with a large amount of unused capacity which, to avoid possible economic disaster, would necessitate finding comparable markets and gas supply, or shifting to present customers a cost which they could not be expected to pay. The commission required the filing of new transportation rate schedules eliminating the cancellation provisions and making rates commensurate with the costs related to the service.

Two commissioners dissent

Two of the five FPC commissioners dissented in this unusual pipeline certificate decision. Commissioner Connole wrote:

"The conditions found necessary in the opinion and order of the majority confirm the fact that the project as proposed is economically impossible of completion. Even in the form which it would take if the conditions were met it would contain so many compromises with principle and rest on so much speculation for its success that the Act does not permit a finding that the public convenience and necessity requires its construction and operation. * * *

"By no means do I oppose bringing natural gas into peninsular Florida nor do I disagree that the economy of the State would benefit from its introduction—if it could be done on an economically sound basis. But the economy most emphatically would not benefit if the project to bring it there were not economically sound. And those in issue here are not. * * *

"Huge volume sales of natural gas for boiler fuel are difficult enough to justify even when there is no question of availability of more abundant and less critical fuel as is the case here. But in this proceeding there will be none of the savings sometimes made available to electrical utilities purchasing boiler fuel gas and no distinguishable advantage to public interest sufficient to justify consuming some 150 MMcf/day or more in the interest of bringing natural gas into an area by this particular project. This record does not demonstrate that this project is uniquely suited to Florida or so overwhelmingly superior to any other that the nation must pay so high a price in terms of using a wasting asset needlessly, even if this project as revised by the majority decision were possible."

Florida pipeline in 1958

There is a pending appeal of the FPC decision, but observers say that it has a slight chance of success. The promoters of the interconnected pipeline from Texas to Florida have been able to meet the strict conditions imposed by the FPC. It is expected that financing will be accomplished by the end of this year, and that the pipeline will be constructed and in operation by the middle of 1958. This case is in a class by itself, and should please producers, pipeliners, distributors, and consumers.■

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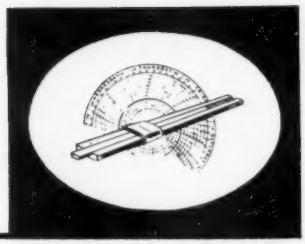

By GUY CORFIELD

High-Efficiency Heat Insulation

The December 1956 issue of the National Bureau of Standards *Journal of Research* describes, in Research Paper 2726, "Heat Conduction Through Insulating Supports in Very Low Temperature Equipment." These are experiments to determine means of supporting containers used for storing and transporting very low temperature liquids (such as liquid oxygen and nitrogen—or, for that matter, liquid natural gas) so that a minimum of heat will be absorbed into the liquid by conduction through the supports.

Two general methods of multiple-contact support were explored. One used glass, micarta or ceramic spheres held between flat steel or ceramic plates, and the other used stacks of very thin stainless steel sheets. The spheres were effective but apparently not very practical from the standpoints of physical assembly, crushing, and indentation of supporting surfaces. The stacks of steel sheets or plates, however, appeared to be both efficient and practical. The insulating value is attributed to the many relatively poor contacts between the plates, which impede the heat flow. Various metal thicknesses were tested, from 0.0008 in. to 0.0195 in. It was found that the thinnest plates were the most efficient and that, for plates of any thickness, efficiency increased as the number of plates (height of stack) increased. As the loading on a stack (pressure per square inch) was increased the heat resistance decreased, due to more intimate contact between plates. However, the effect of pressure tended to lessen as load was increased so that relatively high unit loadings were indicated as giving the greatest overall efficiency. A stack of stainless steel plates, 0.0008 in. thick, at a loading of 1000 psi, showed a thermal conduction of only 2 per cent of that produced by a solid conductor of the same material and overall dimensions. Perforation of the plates still further decreased the heat conduction, as did sprinkling them with a "clean" dust such as manganese dioxide; but greasing the plates, or interposing an organic film such as teflon, decreased the efficiency considerably.

The issue of the *Journal* carrying the research paper describing these results can be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at a cost of 60 cents.

Ultrasonic waves

Ultrasonic waves, or "silent sounds," were just a scientific curiosity a few years ago. Today they are basic to several commercial processes. They are being considered for many more. These waves are similar to sound waves, but above frequencies audible to human ears. They vibrate at frequencies above 18,000 times per second. They are most readily produced by passing electric current through nickel rods, or quartz or ceramic crystals. These convert current to vibration energy.

One use is to remove suspended or excess dissolved gases from liquids. Gases are literally shaken to the surface. Similarly, a cleaning or degreasing solution is highly effective if agitated at ultrasonic levels. The dirt or grease particles are shaken loose from very small cracks or openings.

An ultrasonic tool has been developed. Its tip vibrates 20,000 to 25,000 times a second. Vibrations pass through the liquid solder, giving penetration to produce a perfect bond. This is very effective for forcing solder to the metal surface when soldering aluminum, normally coated with an oxide film. The same principle is claimed to be useful in certain difficult welding processes.

Another technique—familiar to some engineers in the gas industry—is non-destructive inspection of metal for cracks, flaws or corrosion. Waves pass through flawless metal to reflect from the opposite side at a measurable rate. If the far-side surface is corroded, overall thickness is reduced and the "sound" will reflect faster; or if a crack or void is in the metal, sound reflects from the flaw, giving an indication of its location and depth.

Another pipeline carrying solids

A new pipeline has now gone into service, in Colorado and Utah, transporting gilsonite. Gilsonite is a naturally occurring solid material similar to a hard grade of asphalt.

The 72-mile line, costing $2 million, is owned by American Gilsonite, and carries the material from the mine to their new refinery near Grand Junction, Colo. Here it is converted into gasoline and metallurgical coke, the latter used in aluminum production and other purposes.

The gilsonite is crushed and mixed with water in a 35-65 per cent ratio. This slurry is kept under constant agitation in two 200,000-gal. tanks and pumped through the line at a rate of 325 gal./min. The line is never shut down, or the velocity reduced, except when all solids have been flushed out.

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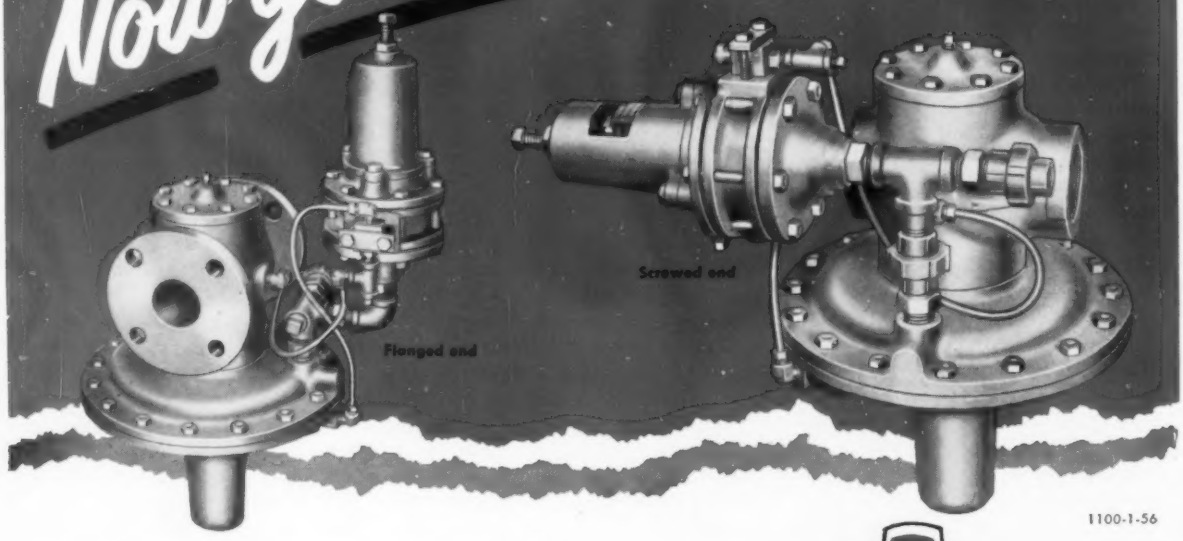

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WASHINGTON

Gas industry facing rough year ahead

by NEIL REGEIMBAL
GAS Washington Bureau

THE gas industry, from wellhead to burner tip, is going to have a rough time in Washington for the next 12 months or so. There will be plenty of public relations fires to put out, and some of the scorches will take a long time to bleach out.

Eventually, the industry will probably get a natural gas bill little changed from the Harris-O'Hara bill as reported by the House Commerce Committee this year. Eventually, also, volume imports of natural gas will probably flow across the border from Canada into the Midwest and perhaps into two spots in the West.

Some part of the El Paso Natural Gas Co. and Pacific Northwest Pipeline Corp. merger may eventually be approved by the courts—maybe all of it.

But in the meantime, things will be tough for the industry.

The Justice Department, looking for the courts to take months or years to settle the El Paso merger case, has stirred up many of the major controversies which the industry has been trying to settle relatively placidly for years.

Timing of the filing of the antitrust suit against the El Paso-Pacific Northwest merger rocked the industry, coming just as the proponents of the natural gas bill were fighting the final battle to get the measure to the floor of the House. It led one sour gas bill supporter to comment: "What the hell, we knew (Attorney General) Brownell has been trying to kill the bill anyway."

A top Justice Department official commented when the suit was filed that it should prove that the Eisenhower Administration is not opposed to regulation of the natural gas industry, even though supporting the gas bill. But the immediate effect was to reload the guns with which opponents of the bill have been repeatedly firing charges that the entire gas industry is a "monopolistic empire," and the bill would simply help expand the monopoly.

Without regard to the merits of their contentions, the El Paso case undoubtedly will provide fresh ammunition for renewed charges next year of monopoly in the gas industry and allegations that the gas bill is a "consumer gouge" measure, designed to force "captive" gas consumers to pay higher prices.

Politically, the El Paso suit and the resultant effects are going to give the gas industry some angry moments.

Government attorneys believe they've got a pretty tight case against the sprawling El Paso gas system as they prepare to go to court to prosecute the first antitrust case brought against a gas pipeline merger. The firms involved don't think so.

El Paso's lock on the natural gas supply for California and Pacific Northwest's sole position in much of the Northwest, government trust-busters say, makes the combination an "unholy alliance," likely to cause trouble. They believe also that El Paso's use of a stock transfer to gain 99 per cent stock control of Pacific Northwest, rather than asset or operating system combination, and the resultant bypass of Federal Power Commission jurisdiction, will shore up their case.

Perhaps yes, perhaps no, uninvolved gas industry lawyers shrug. They're not convinced.

Officials of the firms involved defend the merger as being "in the public interest," and say it will result in lower prices to consumers. They argue that because their prices, supply, and service arrangements are controlled by the FPC, the consumer cannot be injured and the antitrust action is unfounded.

The case was filed in the U. S. District Court at Salt Lake City, Utah, corporate home of Pacific Northwest, but is expected to wind up before the U. S. Supreme Court before it's finally settled.

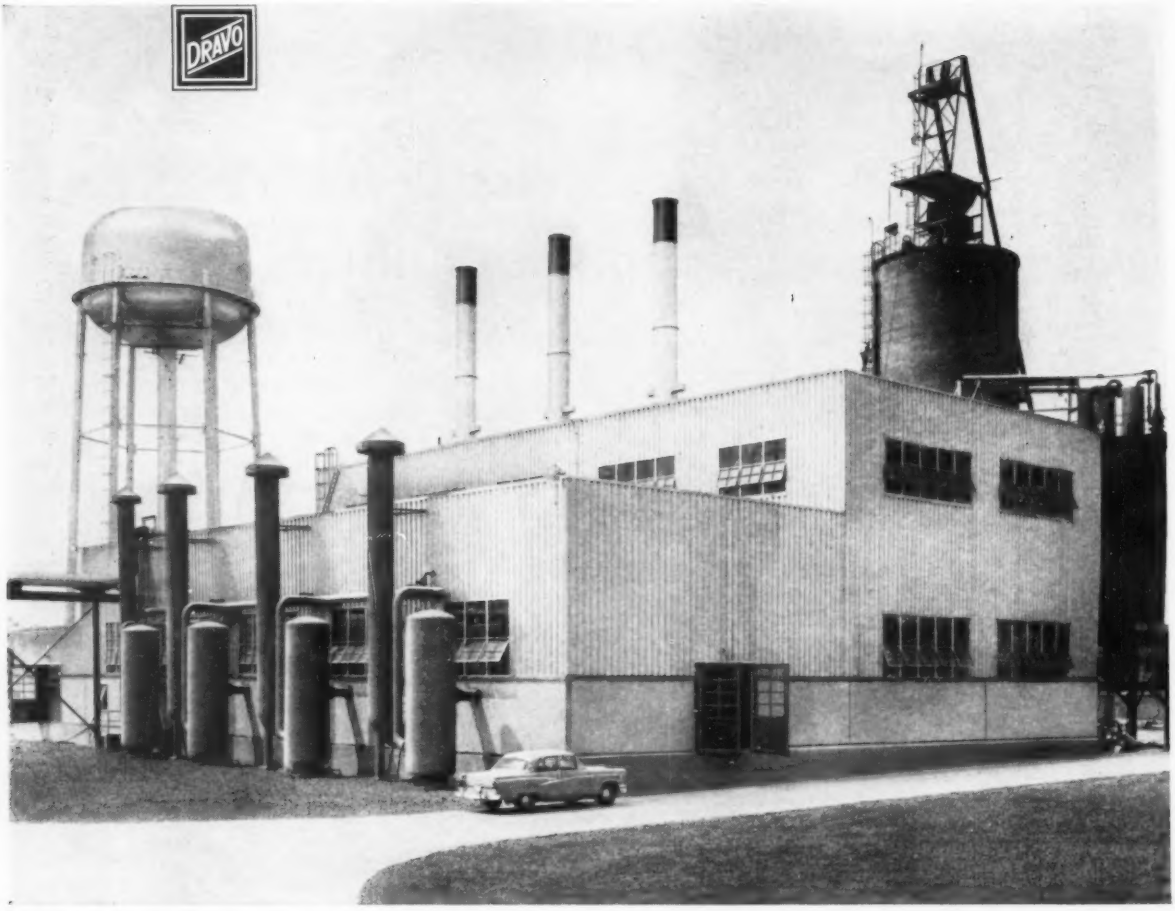
One of the main points on which the government bases its antitrust complaint is that the combination gives El Paso "permanent access" to the Canadian gas sources which Pacific Northwest will tap beginning this fall. As a result, the government contends, the competition which would have been offered to El Paso by the sale of Canadian gas in the western states "has been eliminated," and "potential competitors may be permanently excluded."

By opening up the Canadian import question, the Justice Department has hit a nerve running through a good portion of the gas industry.

Surprisingly, the El Paso defense may be aided by a move which the firm undoubtedly was prepared to fight—the announcement just a few days previous that a group of firms was laying the groundwork for construction of a new continent-spanning gas pipeline from Alberta, Canada, to northern—and probably southern—California.

This line would, if built, run more or less parallel to, and to some extent compete with, the El Paso-Pacific Northwest system.

(*Continued on page* 111)



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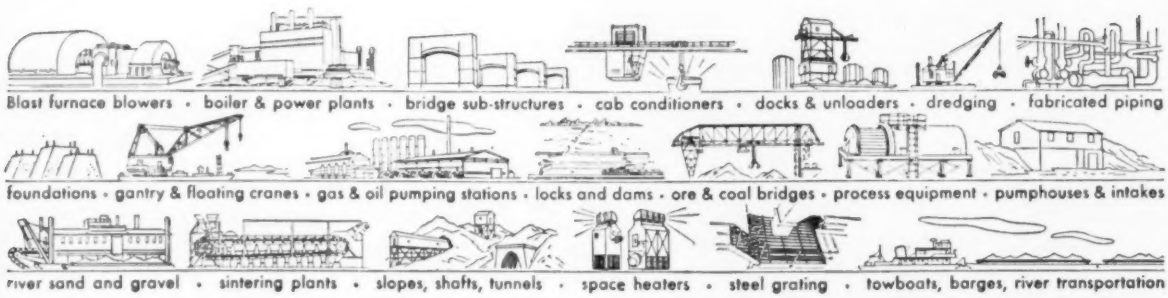
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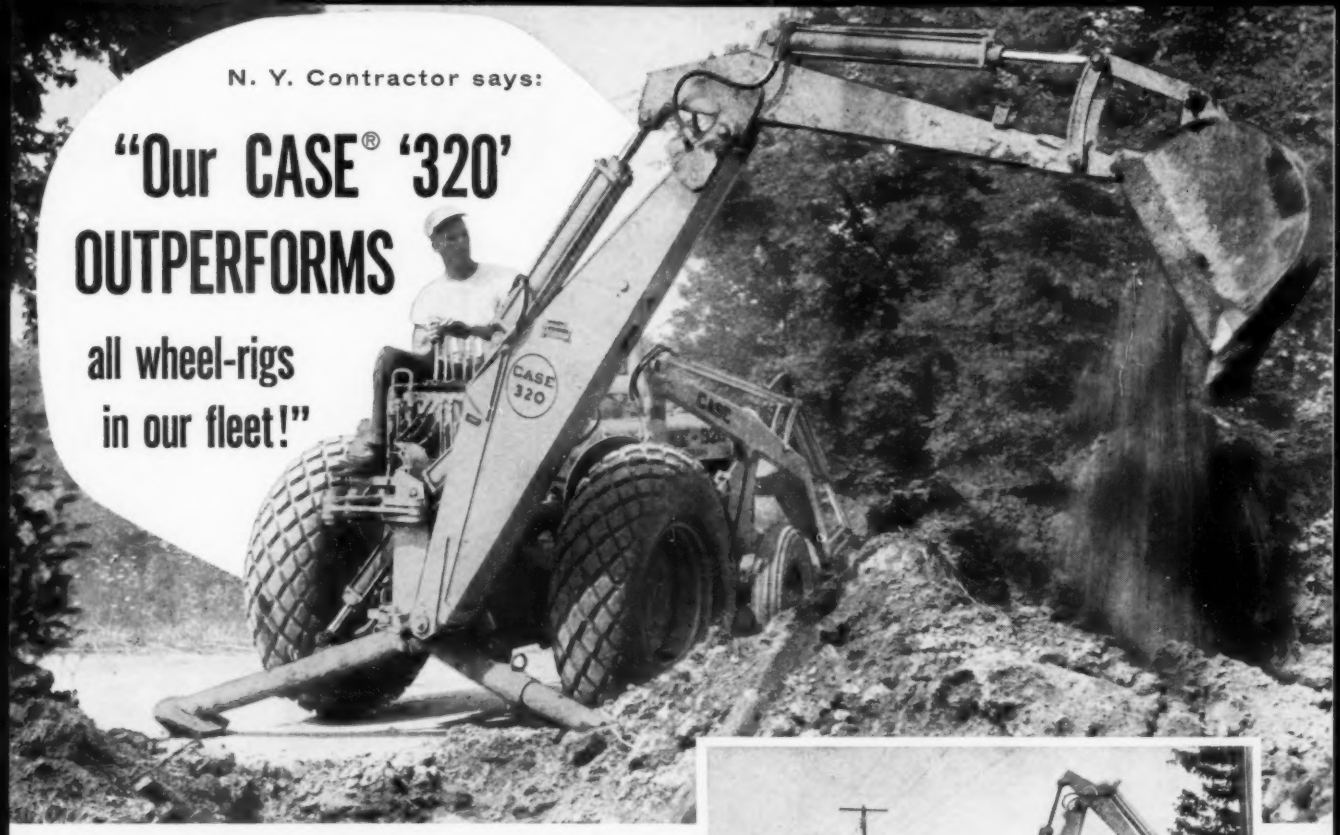

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Keegan's Gen. Supt. Louis Heuer, adds, "We figure the Case backhoe-loader *does the work of a machine and a half*, because we use the same rig with front-end loader for backfilling trenches, loading trucks, and for general clean-up work. Our 320 *uses only 5 to 8 gals. of gas per day*, which is unbelievable for the work it does."

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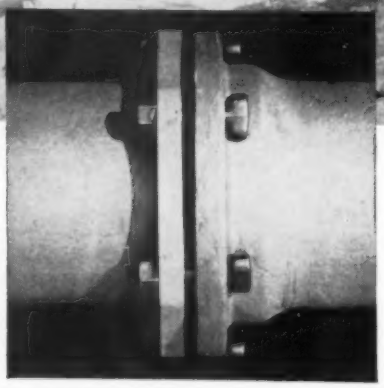

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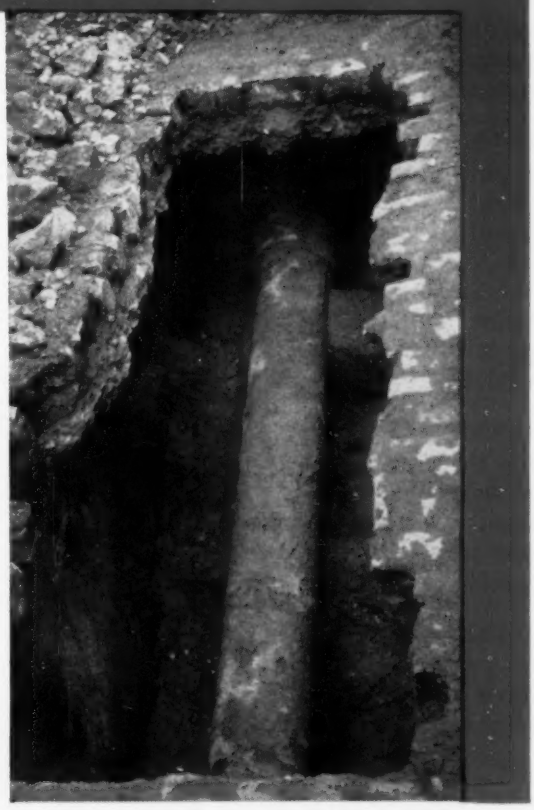

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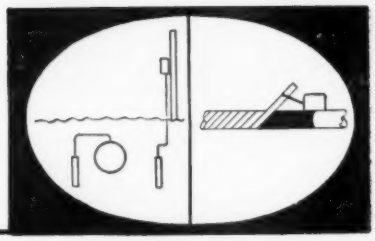

By MARSHALL E. PARKER

The prediction of leak rates

A RELIABLE technique for predicting the rate at which leaks will develop on a bare, unprotected pipeline exposed to a specific environment would be a most valuable addition to the corrosion engineer's kit of tools. If the leak frequency curve could be drawn with confidence—in advance—then the economic comparison could easily be made between the cost of various protective measures (e.g., coating and cathodic protection, or cathodic protection of bare pipe, either complete or "hot-spot") and the cost of repairing leaks and keeping the line in operation by periodic replacements.

Such comparisons would, of course, have to be made in the light of the anticipated useful life of the line. There are also some other factors which would have to be taken into consideration; for example, an essentially hazardous line in a populous area could not be operated on any basis other than that of attempting to prevent any possible leaks. There would be no choice in the case of a line of indefinitely long useful life, except in areas of extremely low corrosivity—but this is a part of the problem of predicting leak rates.

What are the factors which will have to be taken into account in attempting to predict leak rates? First, we have the diameter and length of the line exposed to a given condition. Since soil corrosion is almost invariably of the pitting type, there is a statistical effect which is likely to prove elusive. When we are thinking in terms of leaks, we are not primarily concerned with total metal loss; what we want to know is either (1) the depth of the deepest pit or (2) the number of pits which exceed a certain depth. If a large number of samples are exposed to identical corrosive media, of a type which produces pitting, it will inevitably be true that *the deepest pits will be found on the largest samples*. This is no more mysterious than the statement that the tallest man in California is probably taller than the tallest man in Nevada. Because of this statistical effect, it must be said that the total exposed area in a given environment is an important factor.

Also pertinent is the wall thickness of the pipe. This is more directly and simply involved than is the area. If we can derive a reliable statistical prediction for maximum pit depths, then the leak rate will be the rate at which pits exceed in depth the wall thickness of the particular line involved.

The third, and most difficult, of the factors involved is that of the *exposure*, that is, the soil in which the pipe lies. The exposure of a particular line cannot be characterized simply by a single quantity, because the typical line lies in varying soil, and it is known that the variation itself is of importance. An easier task, but one still difficult, would be the prediction of leak rates in a set of isolated sections of line, each lying in a uniform soil. Although such a predictive technique would fall short of our maximum desires, it would still be extremely useful; the remainder of this discussion will be limited to this artificially simplified case.

Logan[1] has developed an expression for the pit depth-time-area relation, based on combining a pit depth-area equation due to Scott[2] and a pit-depth-time equation by Ewing[3].

$$P = kT^nA^a,$$

where P is the depth of the deepest pit on an area A in time T, and k, n, and a are constants characteristic of a specific soil. Much of the data from which these expressions were derived were based on relatively small samples, so extrapolation is somewhat uncertain at best.

What are the physical bases for the three characteristic constants k, n, and a? Are they independent, or are all three functions of a single measureable quantity? The most commonly used property of a soil by which corrosion engineers attempt to evaluate its corrosivity is its resistivity; no serious claim is made that it will tell us all we need to know about a soil, but it does seem to be true that it tells us more than any other single, easily measured quantity. If we could derive reliable values for the three constants from the resistivity, we would have a useful forecasting method for leak rates.

The quantities k and n do not need to be independent; it is possible that they can both be derived from resistivity, with a fair degree of correlation. The other constant, a, is more elusive, and may be connected with some other factor. These possibilities will be more fully explored in a subsequent installment of this series, as well as some of the interesting possible consequences—and some additional factors which must be taken into account if any serious attempt is to be made to predict leak rates. ■

(1) Kirk Logan, *Underground Corrosion*, National Bureau of Standards Circular C450, 1945

(2) Gordon N. Scott, Adjustment of soil corrosion pit depth measurements for size of sample, Proc. Am. Petroleum Institute (IV) 14, 204, 1934

(3) Scott P. Ewing, Engineering significance of National Bureau of Standards soil corrosion data, Journal of Research NBS 22, 109, 1939

Remote supervision of Pipeline Booster Stations

.... with Pulse Beat telemetering!

REMOTE COMPRESSOR CONTROL · REMOTE VALVE CONTROL
PRESSURE · TEMPERATURE · FLOWS

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- **it is inherently suitable for integration into data reduction and tone transmission systems.**
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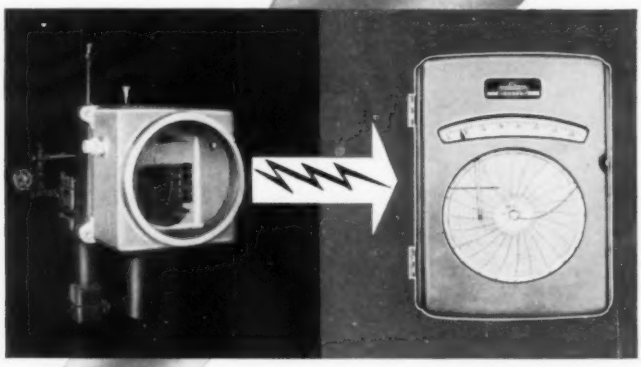

CHRONOFLO TELEMETER FEATURES . . .

- Sensing and receiving reactions depend upon the *positively* controlled duration of regular electric circuit closures and *nothing* more.
- This pure, *positive-action* positioning system *does not* have to *translate* units of electric measurement into terms of function measured.
- Accuracy *not* affected by normal variations in ambient temperatures, static pressures, line voltages, resistance, or inductance.
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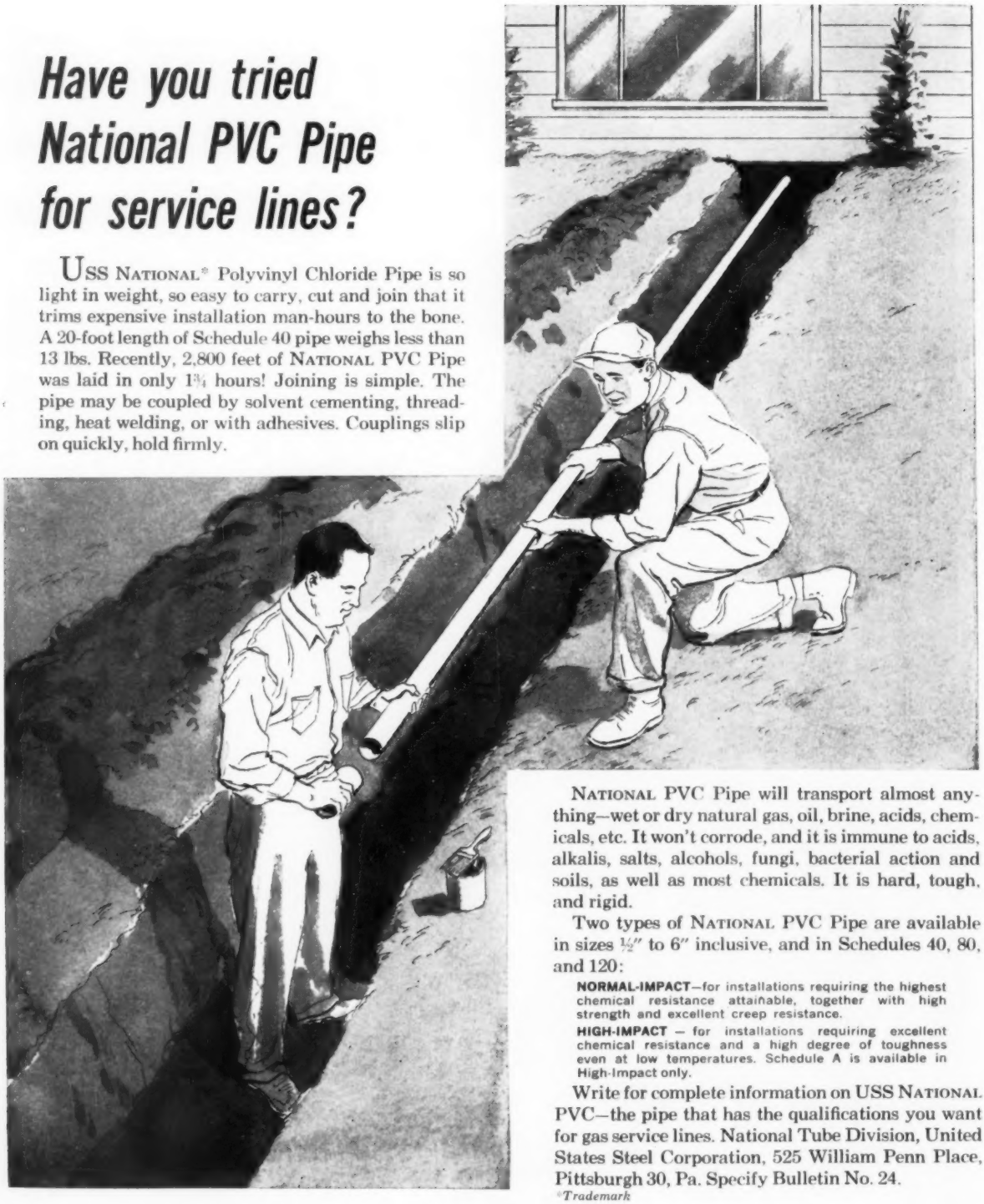
Have you tried National PVC Pipe for service lines?

USS NATIONAL* Polyvinyl Chloride Pipe is so light in weight, so easy to carry, cut and join that it trims expensive installation man-hours to the bone. A 20-foot length of Schedule 40 pipe weighs less than 13 lbs. Recently, 2,800 feet of NATIONAL PVC Pipe was laid in only 1¾ hours! Joining is simple. The pipe may be coupled by solvent cementing, threading, heat welding, or with adhesives. Couplings slip on quickly, hold firmly.



NATIONAL PVC Pipe will transport almost anything—wet or dry natural gas, oil, brine, acids, chemicals, etc. It won't corrode, and it is immune to acids, alkalis, salts, alcohols, fungi, bacterial action and soils, as well as most chemicals. It is hard, tough, and rigid.

Two types of NATIONAL PVC Pipe are available in sizes ½" to 6" inclusive, and in Schedules 40, 80, and 120:

NORMAL-IMPACT—for installations requiring the highest chemical resistance attainable, together with high strength and excellent creep resistance.

HIGH-IMPACT — for installations requiring excellent chemical resistance and a high degree of toughness even at low temperatures. Schedule A is available in High-Impact only.

Write for complete information on USS NATIONAL PVC—the pipe that has the qualifications you want for gas service lines. National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa. Specify Bulletin No. 24.

**Trademark*

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Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Export Company, New York

USS NATIONAL **PVC** PIPE

This seal of the National Sanitation Foundation means—
Tested . . . Approved . . . Sanitary!

UNITED STATES STEEL

There's less chance for leaks with U-BRAND Reducing Nipples

You cut cost . . . speed assembly, too!

When you're reducing line size, you make fewer connections for faster assembly with U-Brand reducing nipples. This means less chance for leaks. You cut installation cost, too. Single reducing nipples cost less than a reducer or bushing and regular nipple.

Swaged from new, mill-tested steel pipe, U-Brand reducing nipples are a single leak-proof unit. True threads and clean outside chamfer speed installation. Available in black or galvanized finish, there are five convenient sizes ¾″ x ½″, 1″ x ¾″, 1¼″ x 1″, 1½″ x 1¼″, and 2″ x 1½″.

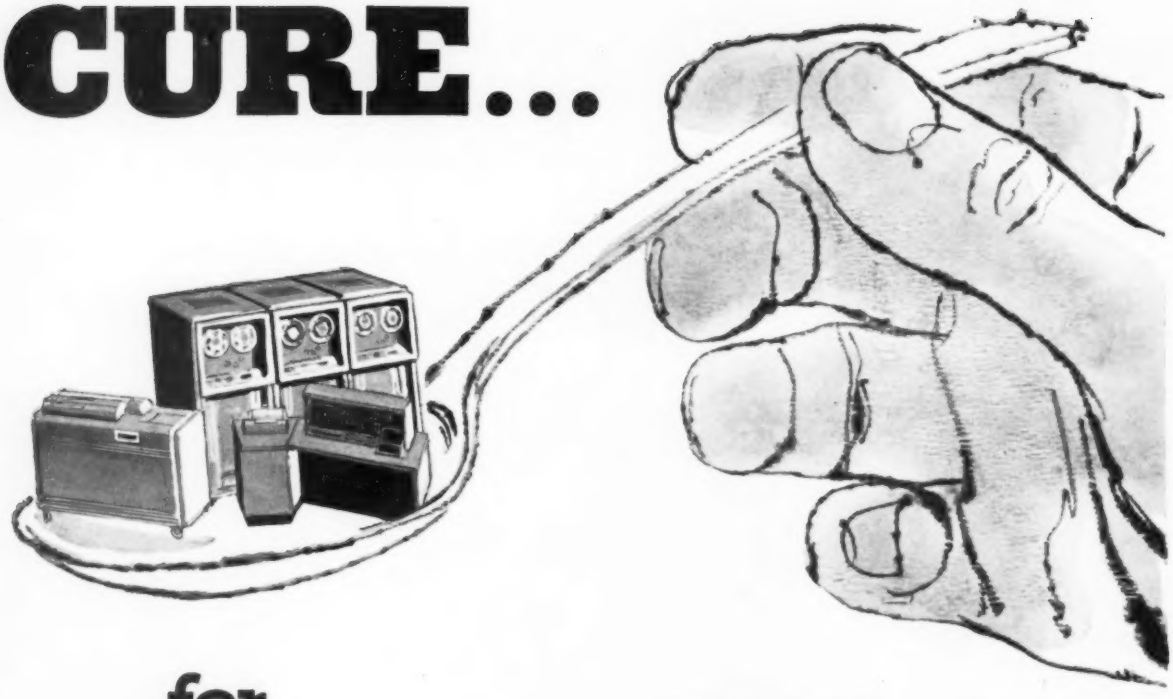
If you're interested in saving time and cutting costs, try U-Brand reducing nipples on your next job. Order some from your supply house today.

A single source for all your pipe fitting needs

Galvanized and Black U-Cote Malleable Iron Pipe Fittings—Unions—Plugs and Bushings—Cast Iron Drainage and Screwed Fittings—Steel Nipples and Couplings—Insert Fittings for Plastic Pipe.

The Union Malleable Manufacturing Company
Ashland, Ohio

CURE...



for public utility growth problems

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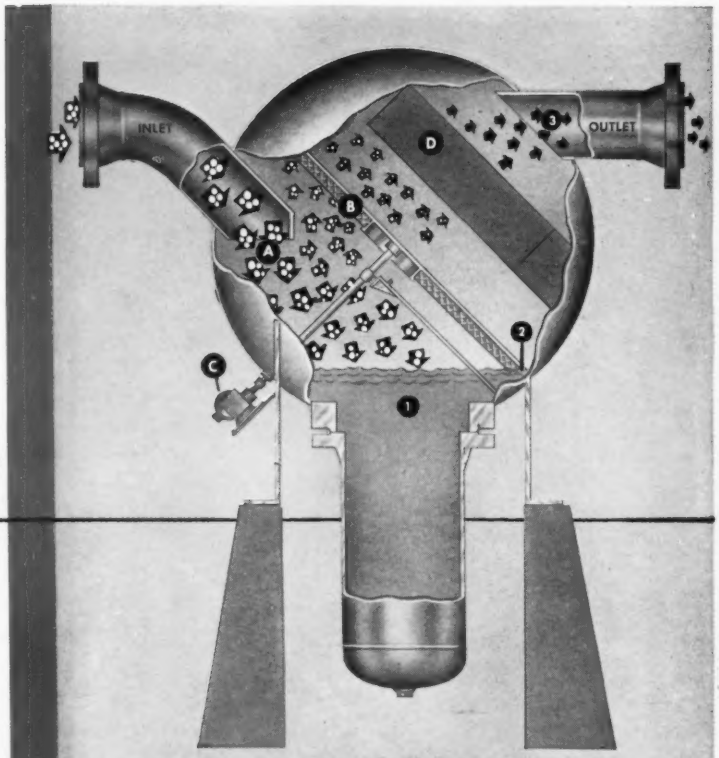
MORE EFFICIENT RESULTS!

PEERLESS SCRUBOSPHERE*

*Spherical scrubber for dust and liquid removal from gas flow

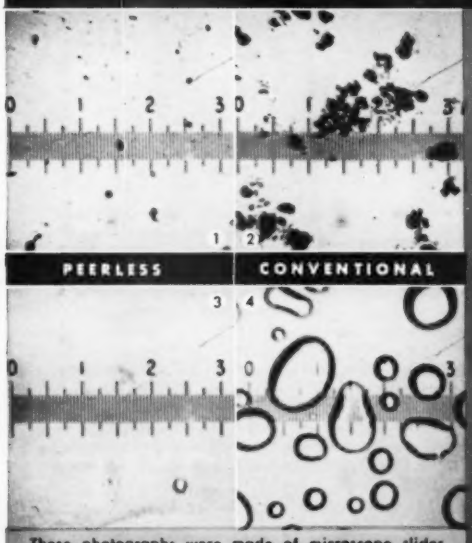


(A) The majority of incoming liquid and solid particles are directed down into reservoir. 1

(B) Lighter solid particles carried by gas stream are separated on surfaces of contactor which are kept wet and clean by revolving through liquid reservoir. 2

(C) Contactor is revolved by explosion-proof gear motor.

(D) Mist Extractor removes any remaining liquid particles from gas stream prior to outlet. 3



These photographs were made of microscope slides introduced downstream of the Scrubosphere and a conventional vertical oil bath cleaner under the same operating conditions. Plates 1 and 2 show the comparative amounts of iron oxide not removed with the amounts introduced being identical. Plates 3 and 4 indicate comparative oil loss with vapor rate through the vessels being the same.

LOOK AT THIS TEST The test at the left indicates the superiority of Peerless Scrubosphere over conventional oil bath dust scrubbers. The SCRUBOSPHERE operates with no loss of efficiency at low flows, minimum liquid loss, and very low pressure drop. Other outstanding features include easy vessel access with removable self-cleaning contactor, a sump for slugs of solid or liquid particles, and minimum cost.

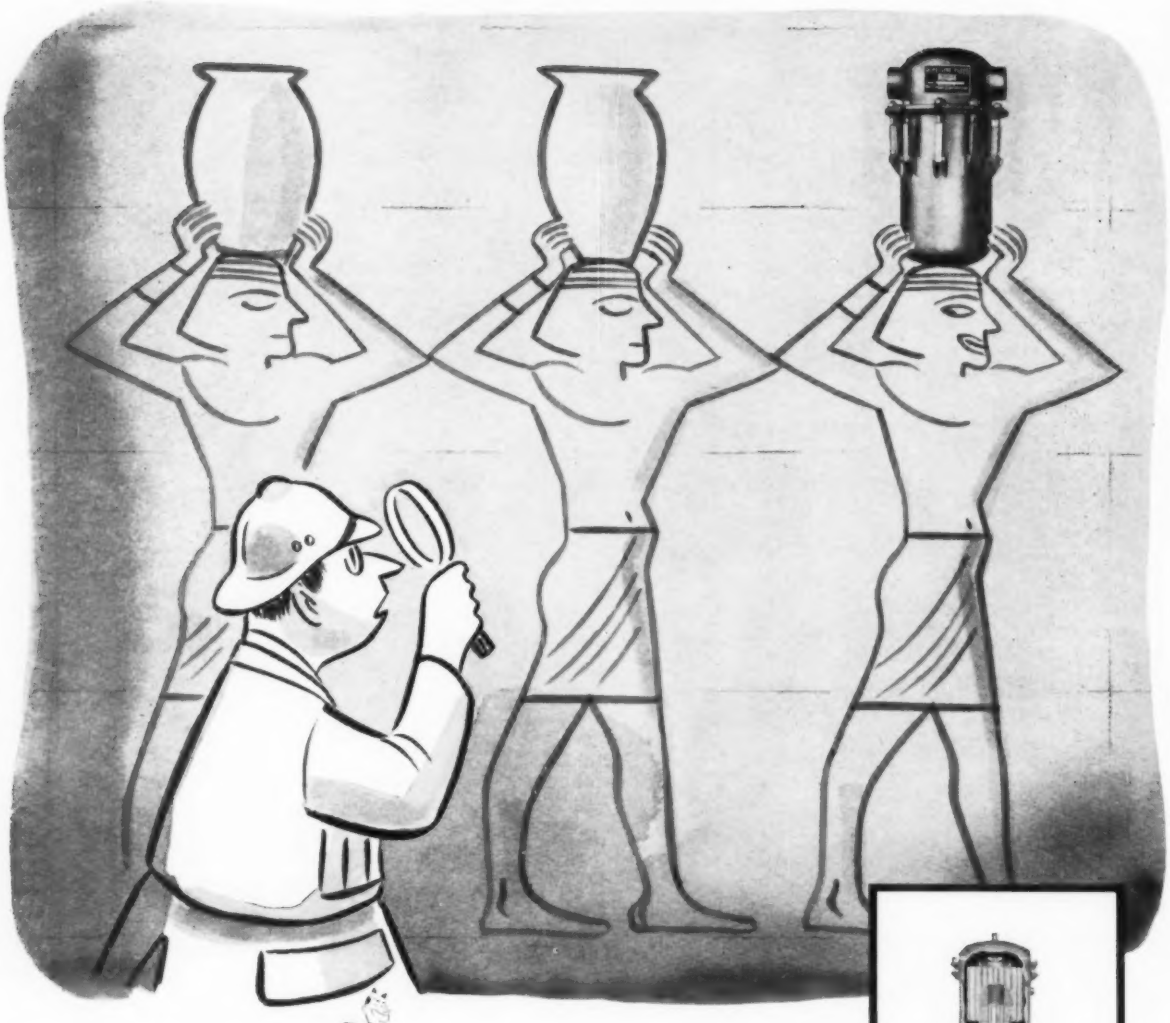
For detailed information write for Bulletin No. 181

PEERLESS MANUFACTURING CO.

P.O. Box 13165 Dallas, Texas

Representatives in All Principal Cities

PEERLESS MFG. CO. DALLAS TEXAS



KEEP IT CLEAN by Phil Tration

. . . And the inscription read, "Many a young pharaoh has gained great riches by placing a Staynew filter in the proper place at the proper time."

Seriously, can you imagine how advanced the art of filtration would be today if the Egyptians *had* known about Dollinger Staynew filters? Dollinger is only thirty five years old, and yet Staynew Filters are the recognized standard of quality throughout the world. Moreover, Dollinger Engineers are constantly developing new filters for new applications, and increasing the world's knowledge of this very new art—filtration. May we help you?

STAYNEW MODEL CPHG GAS FILTERS

are used by utilities to stop lamp black and moisture from entering regulators and pilots. They are also used in natural gas lines to prevent clogged pilots by removing anything from dry oxide dust to oily deposits left from fogging operations. Staynew Gas Filters pay for themselves in reduced maintenance. An extra large filter area is obtained by the exclusive Dollinger Radial Fin Design . . . three times the filter area in the same space, minimum pressure drop, and longer intervals between cleaning. Why not talk your filtration problems over with a Dollinger engineer . . . or write for Gas Filter Bulletin 290-R. Dollinger Corporation, 68 Centre Park, Rochester 3, N. Y.

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LIQUID FILTERS • PIPE LINE FILTERS • INTAKE FILTERS • HYDRAULIC FILTERS • ELECTROSTATIC FILTERS • MIST COLLECTORS • DRY PANEL FILTERS • SPECIAL DESIGN FILTERS • VISCOUS PANEL FILTERS • LOW PRESSURE FILTERS HIGH PRESSURE FILTERS • AUTOMATIC VENTILATION FILTERS • NATURAL GAS FILTERS • SILENCER FILTERS

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COMPRESSION COUPLINGS*

JOSLYN—FOR 55 YEARS
LEADING SUPPLIER OF
CONSTRUCTION MATERIALS TO
THE ELECTRICAL POWER
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Available from stock at all JOSLYN Warehouses

THREADLESS PIPE JOINTS FOR ANY LIQUID OR GAS—WATER, OIL, GAS, CHEMICALS, ETC.

Easily Installed—Simple proven principle eliminates thread cutting and exact pipe fitting—just stab pipe ends into factory-assembled coupling and tighten compression nuts.

Permanently Leak-Proof—Exclusive design insures compression seal of gasket without friction or seizure—use of fine, straight threads produces high compression sealing force at gasket surfaces.

Economical, too—Overall simplicity means low first cost—ease of installation and permanence means overall economy.

Also available in other materials for special applications *Patent Pending

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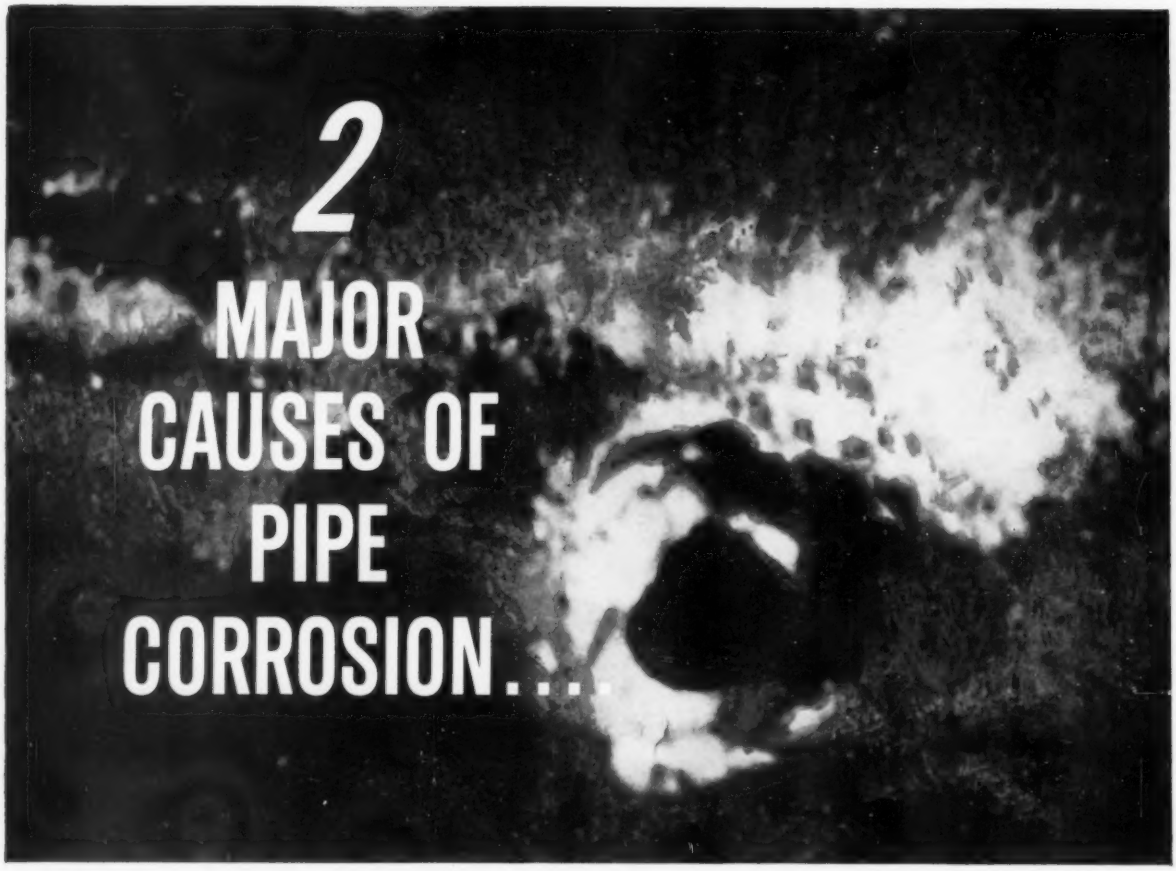
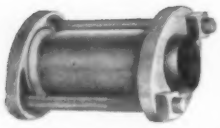
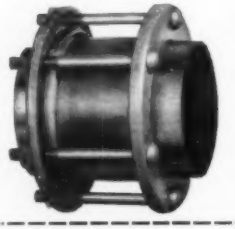


controlled by Dresser insulating couplings!



1¼" ID Style 39, showing two-bolt construction, supplied in sizes thru 2".

6" ID Style 39, showing construction supplied for this size. Note insulating gasket.



This new Dresser green Nylon Insulator will be supplied in all standard insulating couplings and fittings. Gives all-round improved efficiency.

The two major causes of corrosion: stray d-c electric current and dissimilar metals can be controlled by blocking off electric current and preventing its flow from one pipe length to another.

Proved in fifty years of service, Dresser Style 39 Couplings have rubber insulating gaskets compounded to assure optimum insulation and long life. The tough, inert Nylon Insulator is resistant to acids, alkalis, drip oils . . . will not swell.

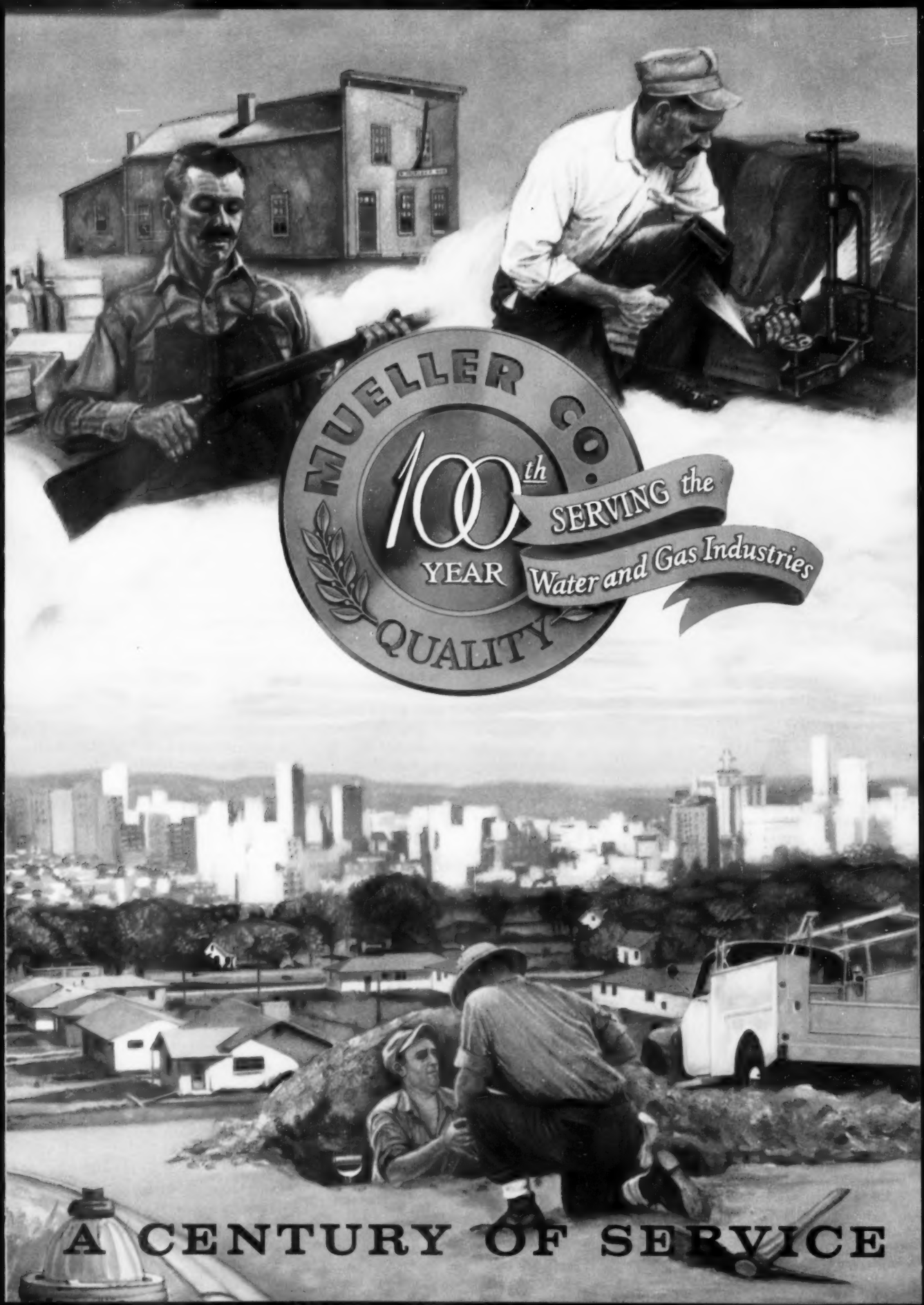
LOWER COST, EASIER INSTALLATION

Dresser Style 39 Couplings are lower in cost and easier to install than insulating flanges. No painstaking pipe fitting, no cutting, welding, or lining up bolt holes is involved. Installation time — a matter of minutes. And *most important*, Dresser Couplings absorb normal pipe movement without leakage and *without disturbance of insulating qualities.* Write today for catalog describing Dresser Corrosion Control Products.

DRESSER® CORROSION CONTROL PRODUCTS

Dresser Manufacturing Division, 59 Fisher Ave., Bradford, Pa. Warehouses: 1121 Rothwell St., Houston; 101 S. Airport Blvd., S. San Francisco. Sales offices also in: New York, Philadelphia, Chicago, Denver, Atlanta, Toronto and Calgary.

ONE OF THE DRESSER INDUSTRIES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YEAR
SERVING the
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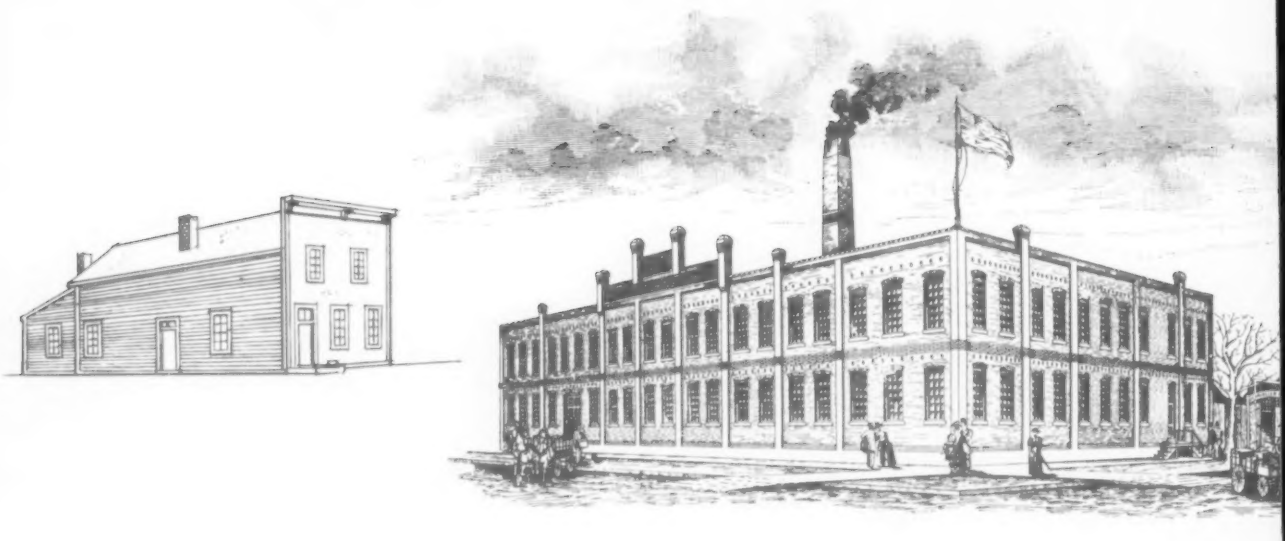
QUALITY
A CENTURY OF SERVICE



ONE HUNDRED YEARS AGO...

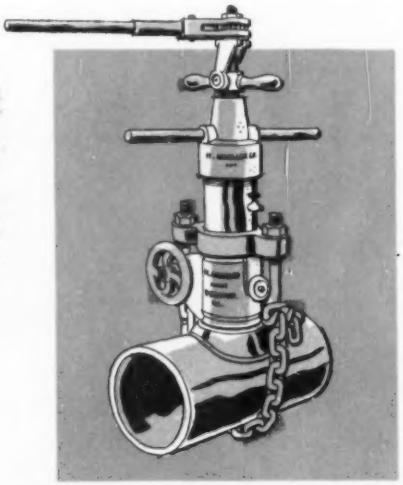
In the fall of 1857, Hieronymus Mueller came to Decatur, Illinois. Opposite the town's livery stable, he opened a one-man shop, making guns and tools and repairing anything mechanical. Mueller's inventive mind and insistence on perfection gained many customers, and the shop prospered.

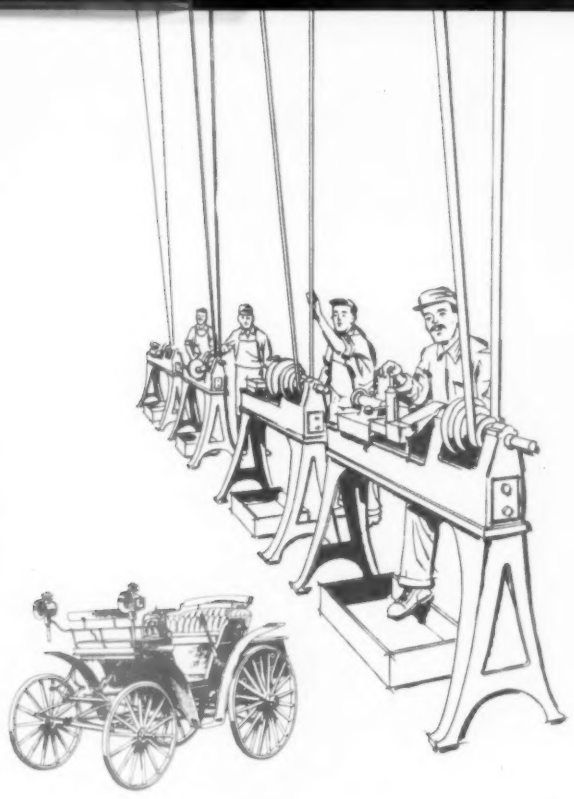
In 1871, Mueller was appointed plumber for the city of Decatur. In those days, the comfort and convenience of running water in the home was possible only after a cumbersome, troublesome service connection was made to the main. The plumber drilled a hole, almost through the main, with a crow and ratchet. A corporation "drive" stop was inserted and was secured in the main by a sharp blow with a sledge—if the blow hit true. If the blow missed, the plumber was drenched and the ditch filled with water, necessitating an interruption in service to all customers while pressure was reduced and the connection made.

Mueller went to work to devise a more efficient method. After weeks of experimenting, he devised the original "B" Tapping Machine, permitting plumbers to drill through the main and insert a corporation stop under pressure, without loss of water. A vital need of an expanding industry had been answered—the first of many answers for gas and water problems through a century of progress.

The "B" Machine established Mueller in the manufacturing field and a new, three-story factory replaced the one-room shop. Sixteen men kept working full time to turn out an annual volume of $25,000 worth of water and gas distribution products. The demand for the luxury of running water and gas for cooking and heating was growing rapidly. By 1896, manufacture of products for these industries had become so important that the original shop was sold.

It was in this era that Mueller became interested in





the new horseless carriage. He developed several innovations for the automobile, including variable-speed transmission, body suspension, water-cooling radiators, spark plugs and breaker circuit. Some of his original, patented ideas are still in use. Hieronymus, convinced of the future of this new invention, made plans to manufacture an automobile. But a gasoline explosion in a workshop on March 1, 1900, ended his life and ended the company's plans for the automotive field.

Mueller's sons assumed the leadership and continued the progress charted by the company's first president. Mueller Co. grew in service, in products, in employees and facilities.

New products were introduced to meet the needs of the gas and water industries and old products were constantly improved. All were tried and tested to the standard of superior mechanical performance and manufacturing perfection that was established one hundred years ago by Hieronymus Mueller.

MILESTONES OF PROGRESS

1857 —Hieronymus Mueller opens general machining and manufacturing shop in Decatur.

1871 —Mueller appointed city plumber.

1872 —First tapping machine invented.

1872 —New Mueller factory erected.

1882 —Invented water pressure regulator.

1882 —Mueller joins AWWA—one of the first five members.

1885 —Large scale manufacturing of brass goods started.

1893 —H. Mueller Mfg. Co. incorporated.

1895 —First building erected at present Decatur plant location.

1895 —Hieronymus Mueller wins first American auto race with car imported from Germany and rebuilt.

1900 —Hieronymus Mueller passes away, March 1.

1902-3 —Decatur plant enlarged.

1905 —Eastern Division with offices in New York established.

1907 —Golden Anniversary Year. "Mueller" trademark registered.

1912 —Mueller, Limited, organized with plant at Sarnia, Ontario.

1917-18—Munitions and other war goods manufactured for allies.

1923 —Los Angeles branch established.

1924 —Company name changed to Mueller Co.

1924 —Copper pipe and fittings added to Mueller line.

1924 —Plant No. 2 in Decatur added.

1932 —Mueller's 75th Anniversary year.

1933 —Chattanooga manufacturing facilities acquired.

1933 —Steel Tees perfected—providing gas companies with simple, speedy service installations.

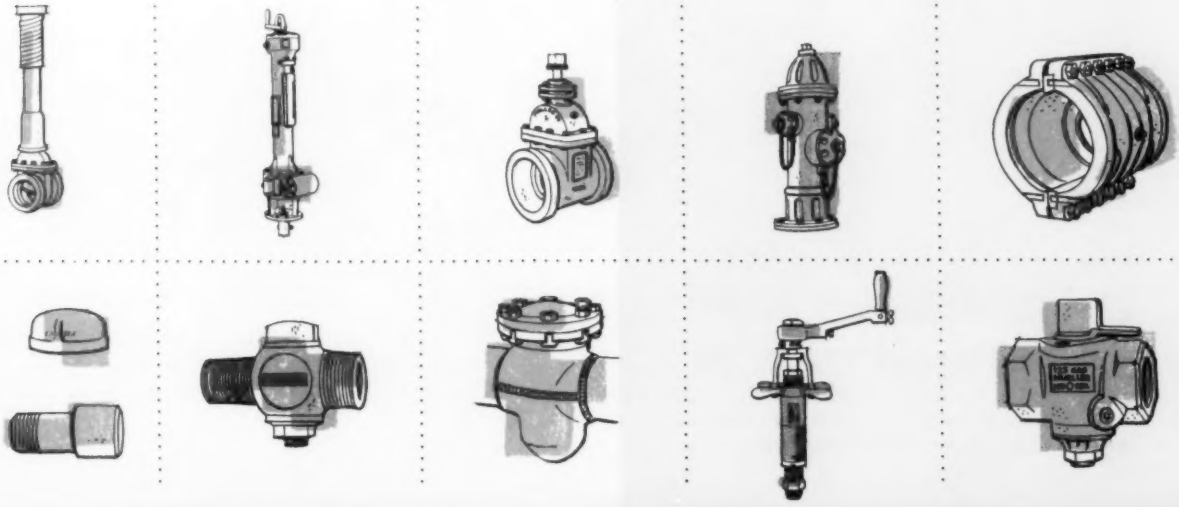
1938 —Line stopper fittings and equipment developed for work on gas or oil lines under pressure.

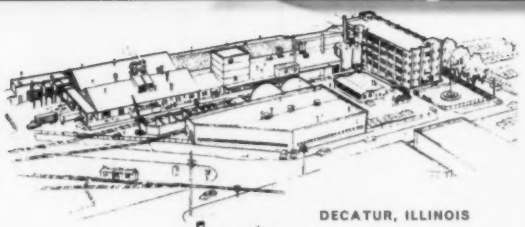
1941-45—Production of war materials claims manufacturing facilities of all plants.

1949 —Full line of No-Blo® equipment presented to the gas industry.

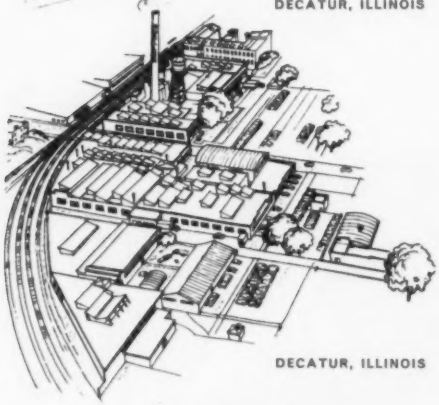
1950 —Tamper-proof gas stop introduced.

1957 —Mueller's 100th year of service to gas and water industries.





DECATUR, ILLINOIS



DECATUR, ILLINOIS

MUELLER® TODAY...

Mueller Co. looks to the future as it meets the needs of today.

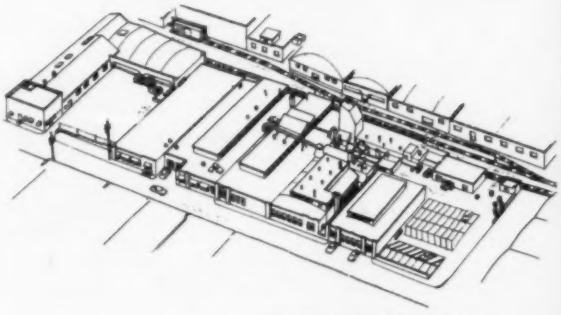
Mueller design and research engineers are already working on tomorrow's problems of the gas and water industries, developing new products and improving current ones.

Five modern factories hum with activity as they manufacture products for our rapidly-expanding gas and water industries. Precision machines and skilled workers insure strict adherence to Mueller's age-old standard of perfection.

A staff of trained salesmen is always available to assist in the selection, application and operation of Mueller products.

Upon the firm foundation established 100 years ago, Mueller management of today is building for tomorrow—for a second century of service to the water and gas industries!

CHATTANOOGA, TENNESSEE



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MUELLER CO.
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Factories at: Decatur, Chattanooga, Los Angeles;
In Canada: Mueller, Limited, Sarnia, Ontario.

MUELLER CO. 100th YEAR SERVING the Water and Gas Industries QUALITY

Since 1857

DRILLING GAS MAINS UNDER PRESSURE: Jaeger "125" rotary compressor powers a Mueller C1-36 Drilling Machine, drilling a 10" main under pressure, preparatory to installing line stopper plug. The unfluctuating pressure maintained by the Jaeger rotary insures a uniformly accurate cut, vital for proper seating of the inserted plug.

Jaeger Rotary maintains constant pressure at slower operating speeds

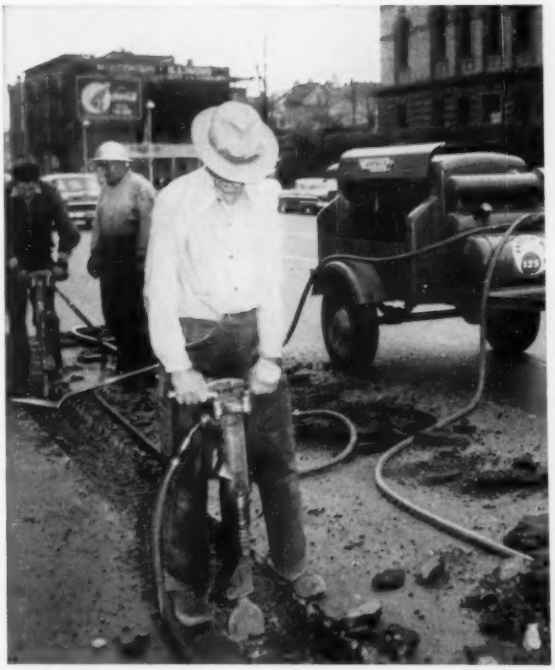
Jaeger compressors produce the same volume of air as other rotaries at 100 to 250 rpm slower engine speeds. Full load speed of a "125" is only 1700 rpm, of a "600", just 1650. This higher Jaeger efficiency saves horsepower, saves fuel, saves engine and compressor wear.

Instantaneous air delivery and smooth, stepless speed modulation enable a Jaeger rotary to maintain 100 lbs. constant pressure under all normal operating demands.

8-hour fuel tanks, full size tool boxes and retractable pneumatic tired dolly wheel are standard on all 2-wheel models. For complete data or demonstration, ask your Jaeger distributor or write for Catalog JCR5.

JAEGER "250" — biggest rotary compressor on two wheels. 4-wheel units to 600 cfm.

THE JAEGER MACHINE COMPANY
661 Dublin Ave., Columbus 16, Ohio
PUMPS • CONCRETE MIXERS • TRUCK MIXERS • PAVING MACHINES



FAST TRENCHING: Jaeger "125" maintains full pressure in two #25 Thor breakers. Speeds trench cutting and other work with power tools.

From well head

All of your measurement and control

Now, your American® representative can supply you with OIC valves and provide all the equipment required to measure, regulate and control gas flow from well head to burner tip. Working together, American's complete family of precision designed and engineered products, and OIC valves, bring you maximum efficiency, low maintenance cost and trouble-free service.

OIC LUBRICATED PLUG VALVES assure pressure-tight seating — dependable operation.

OIC Triple-Seal Valves

OIC lubricated plug valves are precision designed and engineered with an exclusive triple-seal to provide positive shutoff. OIC valves are stocked in quantity by American Meter Company, assuring prompt delivery.

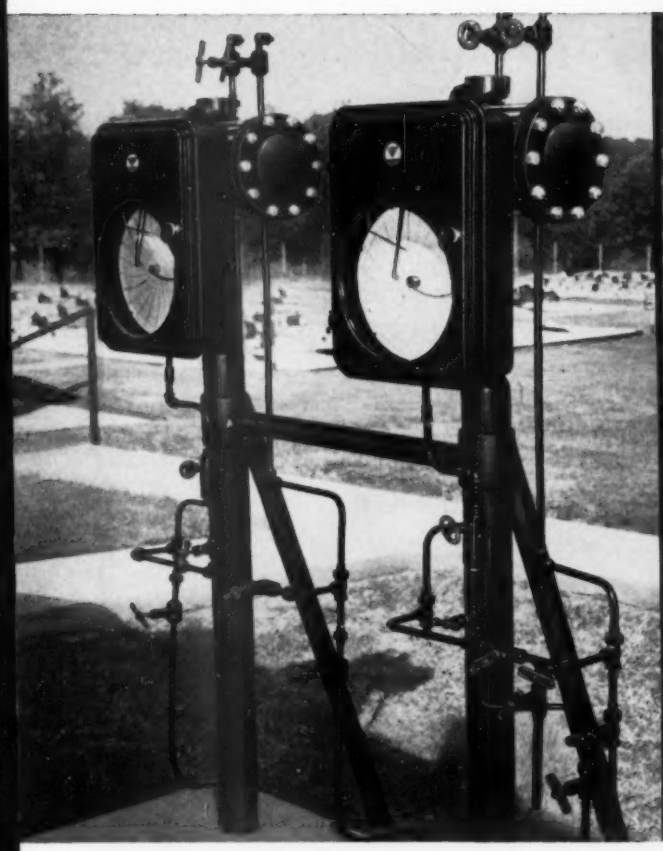
OIC VALVES

FORGED & CAST STEEL, LUBRICATED PLUG, BRONZE & IRON VALVES

Distributed to the Gas Industry by .....

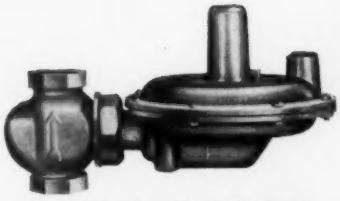
to burner tip...

equipment from one dependable source



AMERICAN DRI-FLO METERS provide precision measurement of large gas volumes.

RELIANCE TYPE "P" REGULATORS reduce and accurately maintain system pressures.



RELIANCE 1400 SERIES REGULATORS maintain precise pressure to appliances.

AMERICAN WELDED STEELCASE METERS assure new economies in displacement meter measurement.

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American Meter Company has pioneered the advancement of all phases of gas measurement, regulation, control and testing of gases for more than 120 years. Today, American provides a complete line of meters, regulators, instruments, valves, test meters and apparatus for the Gas Industry.

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INCORPORATED (ESTABLISHED 1836)

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. . . the slow-motion meter you can rely on longer

Designed from scratch to take advantage of all the time-tested advances in meter technology . . . built in Superior's new plant to exploit all the latest meter design and manufacturing techniques . . . operating at only 7 revolutions per cubic foot to reduce wear and stay accurate longer . . . that's the story of the new Superior aluminum case meter.

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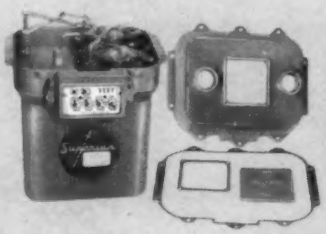
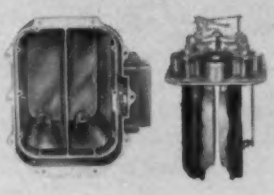
Look at these advanced design features:

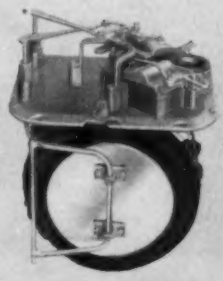
1. Simple, horizontal seam . . . eliminates leakage . . . easier maintenance
2. Easily accessible table . . . just remove the screws holding top



3. Valve seat readily accessible for grinding when top is removed
4. Meter top removable without taking off index box
5. Valve table lifts out with entire mechanism



6. Slow movement; only 7 revolutions per cubic foot
7. Cupped handling lids permit easy and safe carrying



ALUMINUM CASE METERS

In 250 cfh and 340 cfh sizes to meet most domestic requirements.

8. Broad base for solid stacking ...designed for conveyorized handling

9. Accurately controlled diaphragms... no inaccuracies from deflection

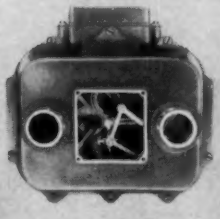
10. Seam gasket stays resilient ...cork and Buna-N composition

11. Heavy-duty, sintered bronze bearings oil-impregnated for life

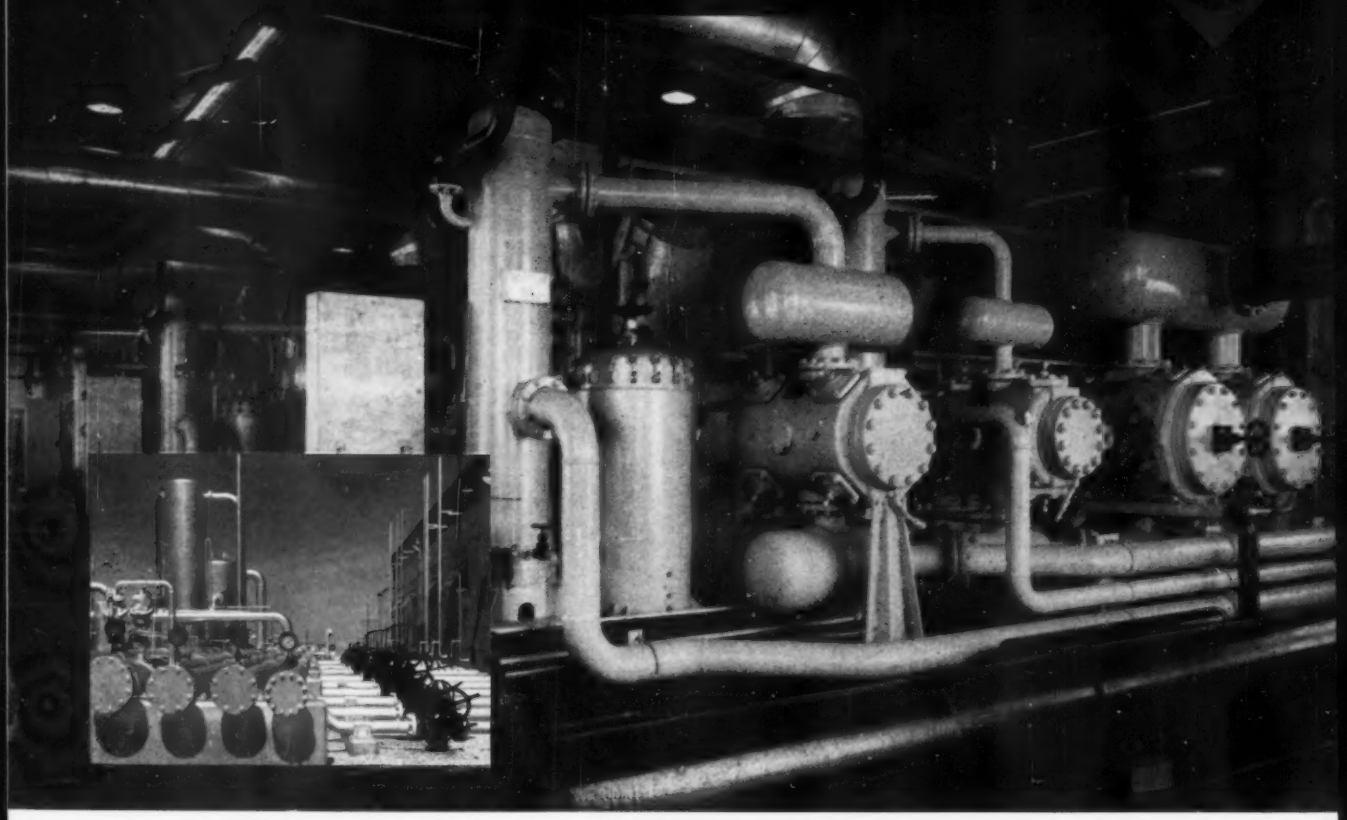
12. Index removable without removing meter

13. Flag arrangement gives arm smoother operation and longer life

14. Handy access for tangent adjustment and calibration



BEAIRD-INGERSOLL-RAND Packaged Compressor Plant



REEF FIELDS GASOLINE CORPORATION'S Good Field Compressor Station—equipped with five Beaird-Ingersoll-Rand 660 h.p. 12SVG packaged compressors . . . Young radiators and all necessary controls. Other sizes 120 to 660 h.p.

Boost Gas . . .

PACKAGED COMPRESSORS HANDLE 278 SPRAYBERRY WELLS

another AMF product
PACKAGED COMPRESSOR PLANTS

LOWEST COST PER HORSEPOWER INSTALLED

Reef Fields Gasoline Corporation built the Good Field Compressor station to boost separator gas from low pressure wells to a natural gasoline plant sixteen miles away. Originally planned to handle Good Canyon Reef Field, the station has now been expanded to gather gas from the Jo-Mill Sprayberry Field. Five Beaird-Ingersoll-Rand 12SVG 660 h.p. packaged compressors have been installed to handle this increased load.

Picking up from the wells at 3 psig. the units boost the gas through three stages of compression to discharge at 600 psig. At present 278 wells are tied into the station which has a total volume of 18,000 MCF per day. Of this capacity, the five Beaird units recently added, are handling 12,000 MCF per day.

Packaged compressors were selected for the Good Field Station as total compressor requirements cannot be determined until the Sprayberry field is fully developed. Also the field is expected to have a relatively short life. As production tapers off, the units can be moved one at a time with little or no change to other service. The remaining units can be kept fully loaded in this manner until the field is depleted.

Let us give you all the facts about the economy of installing multiple Beaird-Ingersoll-Rand packaged compressor plants.

THE J. B. BEAIRD COMPANY, INC.
Shreveport, Louisiana
A subsidiary of American Machine & Foundry Company

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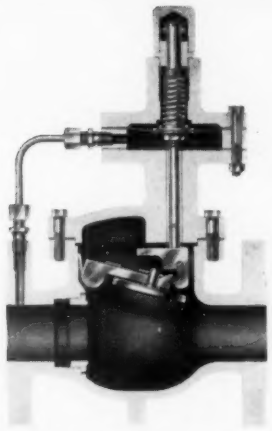
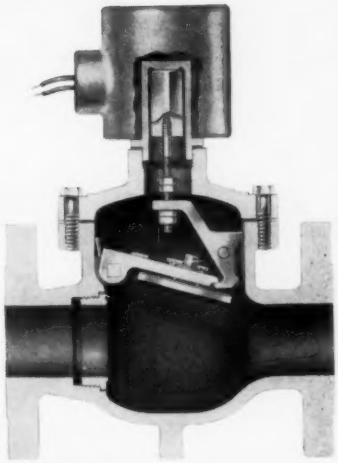
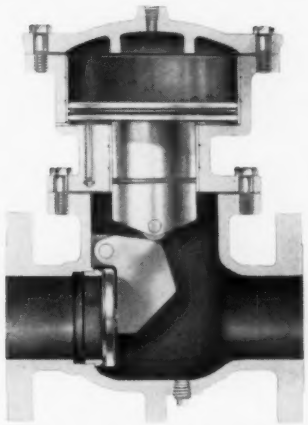


Model 1500H shown, is a high pressure shut-off valve which closes automatically and instantly when predetermined high pressure is reached. With addition of a fusible metal plug, valve can be furnished to shut off on overpressure and/or over-temperature. With control pressure above diaphragm, valve can be made into a low pressure shut-off valve. Combination high and low pressure shut-off also available.



Model 1700 shown, is a Solenoid operated valve normally energized to maintain valve in open position. On interruption of electric current valve closes instantly. Model 1800 Solenoid shut-off valve available to shut off gas instantly by applying electric current either automatically or through a "panic" button.

Instant action, sure and safe with Coppus Sentry® Valves



Model 3000 shown, is a piston operated valve, which opens instantly when pressure above the piston is released. Restoring the pressure above the piston closes the valve. The operating pressure above the piston can be obtained from the line or from an independent source of gas or liquid and can be automatically released or applied by instrument air or gas operated pilots or by use of a small three-way Solenoid valve.

Sentry Valves assure better protection of personnel and property. Instant, split second action with full flow, available in two basic types. Sentry Latch type valves for instant automatic closing; Sentry Piston type valves for automatic opening and closing.

The Latch type requires manual reset — the piston type can be opened and closed automatically.

Sentry Valves can be actuated by high or low pressures, by excessive temperatures, by excessive flow or electrically by use of a Solenoid.

Standard sizes — all Full-Flow — in steel or meehanite 1½" to 8".

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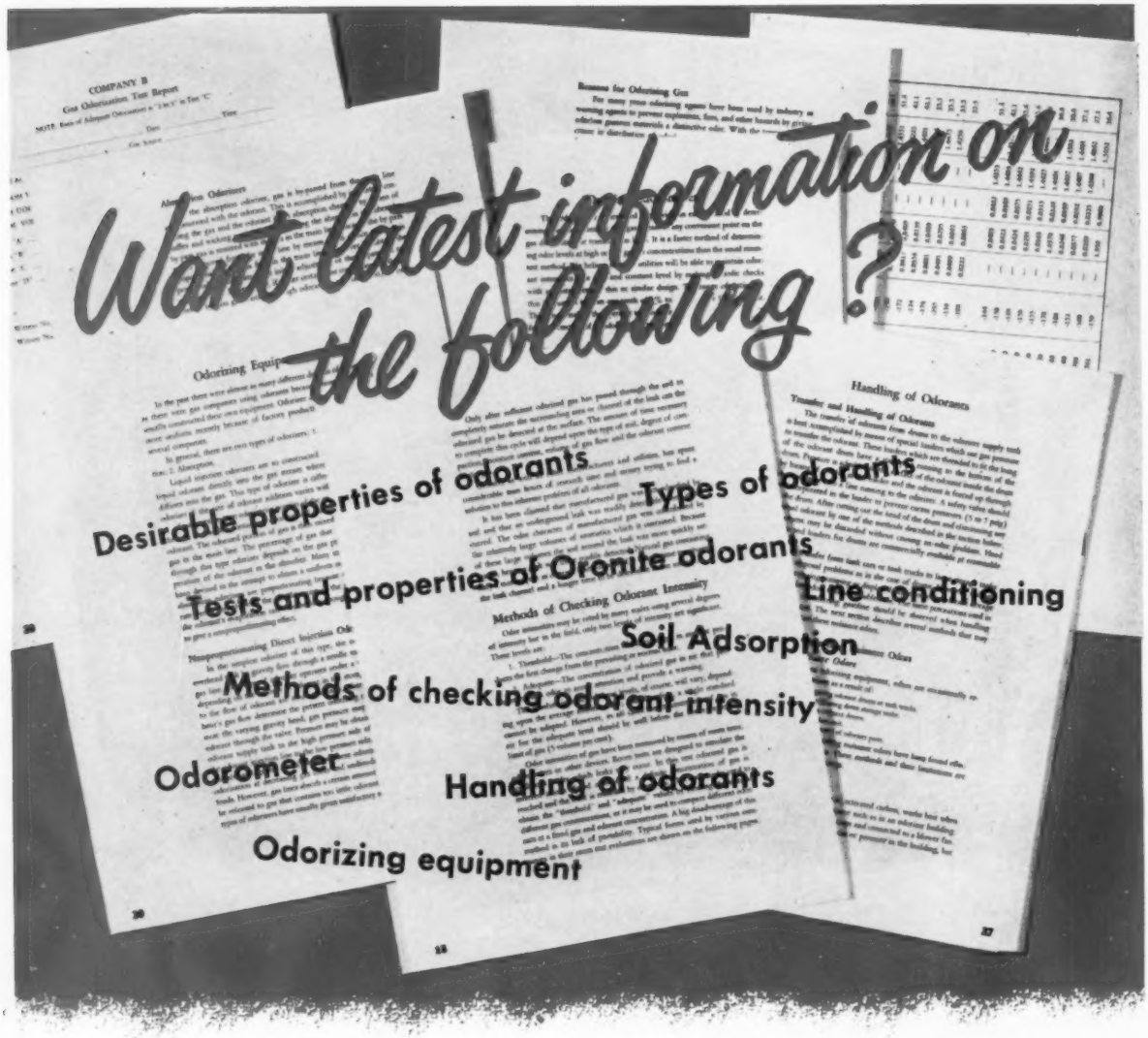

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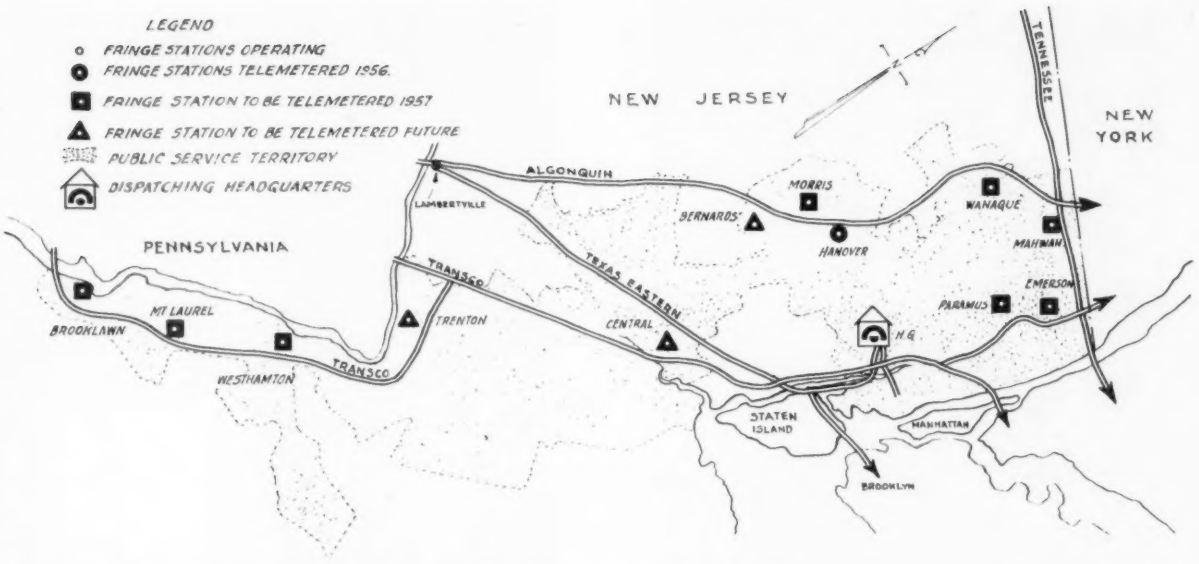


Fig. 1. Location of natural gas transmission lines crossing New Jersey and pressure reducing and metering stations feeding Public Service fringe territory.

GAS exclusive

Computing telemetering systems in gas distribution network

THE population of New Jersey has been increasing rapidly during the last dozen years, especially in the northern area adjacent to the burgeoning metropolitan sections of New York and New Jersey. One primary reason for this growth lies in the recently created system of high-speed superhighways which now criss-cross the state, including the Garden State Parkway and the New Jersey Turnpike. These turnpikes, providing rapid access to the metropolitan centers, have allowed the population to spread out generally into the rural and suburban sections of the state, away from the more densely populated urban areas. This tremendous growth and dispersion in population greatly increased the gas load in the state.

The problem was how to provide for the increased load efficiently and in the most economical way.

The Public Service Electric and Gas Co. which distributes gas throughout a great portion of New Jersey is solving the problem and augmenting its operations by using natural gas. Since we are using natural gas at six gas plants in the state in reforming, jetting and other operations, we have been purchasing gas from the pipeline companies already (*Fig. 1*). Our contract, of course, was set up on the standard penalty-clause basis, and we have been operating for some years without any difficulty in this regard, since our industrial loads in the urban areas were well known and dependable.

Taking advantage of the natural gas pipeline locations in the fringe areas, Public Service is now converting the service in these areas from mixed gas to straight natural gas and is thus saving the investment that otherwise would be required for large feeder mains to deliver manufactured gas to these areas from the gas plants.

The plan for the dual use of the two types of gas involved a number of unknown factors and areas of uncertain demand; therefore we

By HENRI V. PRECHEUR, Instrument Engineer
Public Service Electric & Gas Co., Newark, N. J.

GAS
SEPTEMBER 1957

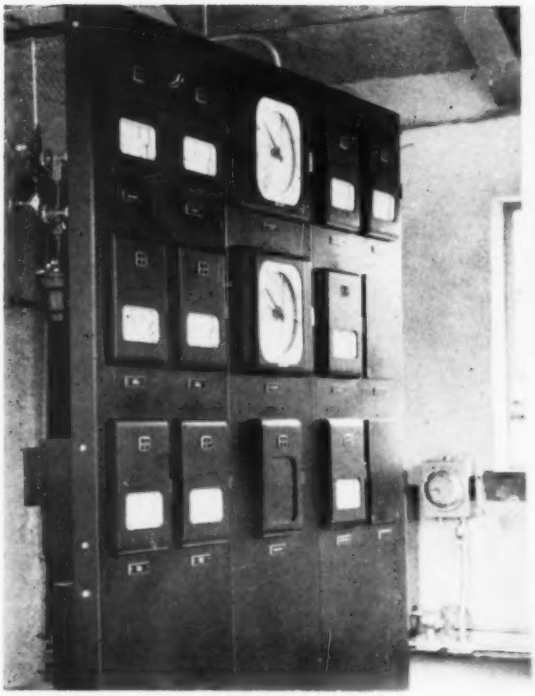


Fig. 2 (left). Measuring and transmission center of computing telemetering system. Panel contains various flow and pressure telemeter transmitters, totalizer, and calculator with its associated compensating equipment. Final, corrected Q which is computed on the round chart in panel center is retransmitted to dispatch center at Harrison, N. J.

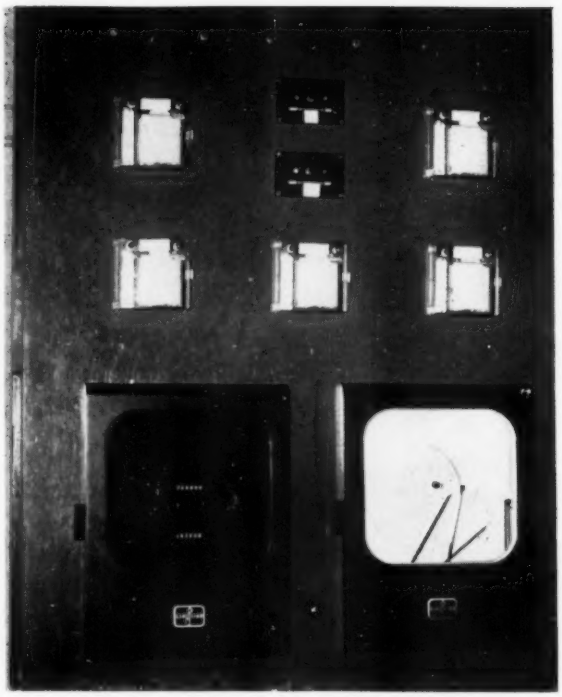


Fig. 3 (right). Temporary receiver panel at Harrison dispatch center. Instrument at upper left records corrected Q, instruments at right intergrates total Q continuously. Thus, both trends in load conditions and the current total are presented at all times.

required an absolutely dependable and accurate means of keeping checks on the gas load at all times so that we might operate profitably within our contract load.

Since the gas plants which had used natural gas previously were manned 24 hours a day, it had been the practice for an operator at each plant to call in data to the dispatcher at Harrison, N. J. every two hours. The dispatcher was then able to allocate gas flows on the basis of the needs at the various plants, on weather forecasts, and other factors.

However, with the advent of the fringe area metering stations, the dispatcher was placed in a position where he had no control over the residential customer load, or knowledge of the flows and orifice differentials in the various stations. Thus, we were faced with the necessity of designing dependable equipment which could funnel information to the dispatcher's office from a number of remote locations —information on the instantaneous flow of the gas, as well as on the accumulated total quantity used. This equipment had to operate continuously, and had to be simple enough in operation so as not to require the attendance of "research" engineering personnel with specialized knowledge. The equipment had to be reasonable in cost, and had to have extreme flexibility in order to take into account seasonal, weekly, and hourly changes in gas loads and demands. In addition, and probably most important, it had to have an accuracy within at least 1.5 per cent of the actual billing meter totals from the vendor.

Since we knew about a Bristol flow-computing system installed by the Consolidated Edison Co. of New York, we made an inspection trip there to ascertain whether that system could form a practical basis for our requirements. We decided that we needed a number of additional features which the Consolidated Edison system did not have, and presented the problem to the Bristol Co.

The total flow values which the dispatcher needed from each fringe station so that the company could operate efficiently within the contracted rate required that the corrected flow be given in terms of the basic orifice formula, namely:

$$Q = C_7 \sqrt{dp \times P_{static\ (abs.)}}$$

We wanted to eliminate as many calculations as possible, and thus insisted that the equipment would automatically correct for all of the constants, including the deviation factor (supercompressibility), temperature, and specific gravity of the gas. In addition, the total absolute pressure and the differential pressure were to be included in this computing system to give the corrected "Q."

Besides these corrected flow figures, the dispatcher needed infor-

mation on the pressure at the vendor's mainline as it entered the fringe station, a pressure reading showing the results of the first cut by the vendor, as well as pressure readings showing results of the second and the third cuts. Also, he needed information on the atmospheric temperature and the temperature of the water in the gas heaters at the station as a check on the heater operation. He wanted information on the current flow rate as well as the totalized value for the day, and pressure data on the known low points in the system. Furthermore, the dispatcher wanted to be able to control the Public Service regulators at each of the metering stations from the dispatching headquarters. This involved giving him the ability to raise or lower the setpoints of each of the two city regulators at the stations, so that he could adjust the pressure into the distribution lines in any area.

Thus 11 functions were needed between the dispatching center and the regulating station in question. If the remote system chosen required a pair of lines (or one line plus ground) for each function, the total transmission line costs would far exceed any possible economic justification in an area with as high rental costs as the state of New Jersey. We determined, however, that by making use of Hammarlund audible tone equipment, we could transmit a total of up to 24 functions simultaneously, and also have the privilege of sending in both directions simultaneously. Thus, the telemetered information signals could be sent to the dispatcher's office at the same time that the set-point control signals were being sent from the dispatcher's office to the station regulators.

We placed a tentative order with the Bristol Co. for a computing telemetering system which would operate in conjunction with Hammarlund tone equipment to provide the desired information and control. We initially set up a proposition to the Bristol people that they would design the equipment and set it up in its entirety at the factory. They would then test it on the basis of calculations which we would make (unknown to them).

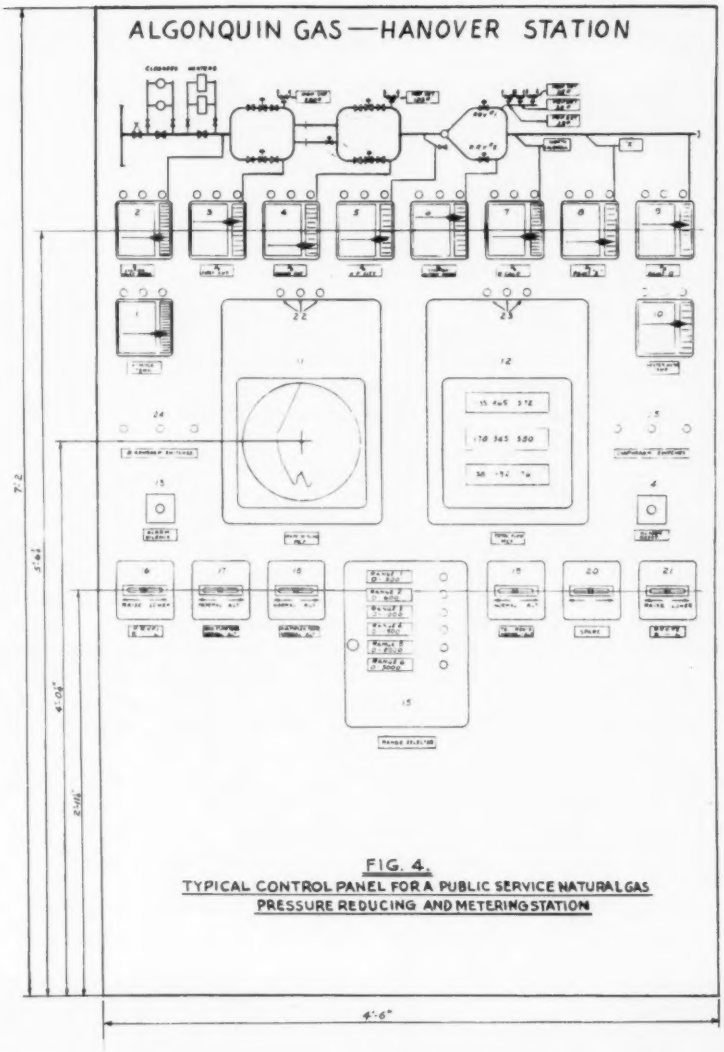
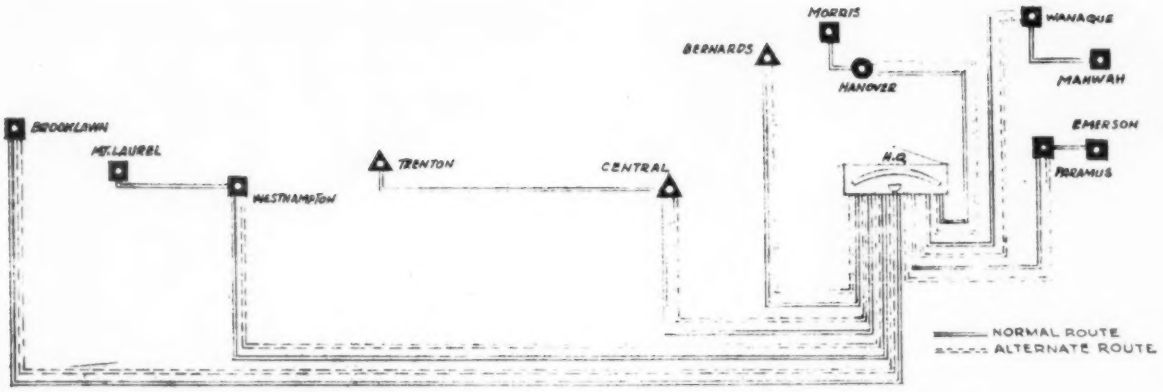


FIG. 4.
TYPICAL CONTROL PANEL FOR A PUBLIC SERVICE NATURAL GAS PRESSURE REDUCING AND METERING STATION

KEY TO PANEL BOARD DIAGRAM.

1. Miniature receiver; atmospheric temperature, low alarm only.
2. Miniature receiver; P_1 station inlet pressure, high and low alarm.
3. Miniature receiver; P_2 first cut pressure, high and low alarm.
4. Miniature receiver; P_3 second cut pressure, high and low alarm.
5. Miniature receiver; P_4 high pressure city; high and low alarm. (future)
6. Miniature receiver; P_5 station outlet pressure, high and low alarm.
7. Miniature receiver; P_6 low point #1 pressure, high and low alarm.
8. Miniature receiver; P_7 low point #2 pressure, high and low alarm.
9. Miniature receiver; P_8 low point #3 pressure, high and low alarm.
10. Miniature receiver; heater water temperature, high and low alarm.
11. Rate of gas flow receiver; (high and low alarm for range change).
12. Gas flow integrator (hourly and continuous).
13. Alarm silencing button.
14. Alarm reset button.
15. Range selector switch.
16. Raise-lower control switch for PRV #1.
17. Normal-alternate tone selector switch for gas flow.
18. Normal-alternate tone selector switch for multiplex.
19. Normal-alternate telephone route for all information.
20. Spare
21. Raise-lower control switch for PRV #2.
22. High-low range signal lights.
23. Multiplex synchronizing lights.
24. Switches to designate operating PRV's.
25. Switches to designate operating PRV's.



System of telephone line bridging to be used to connect adjacent stations to dispatch center.

If the results came within 1.5 per cent of the data supplied, the system would be acceptable to us; otherwise we would not accept it. Bristol agreed to do this and the factory tests proved satisfactory.

The equipment was then carefully shipped to Hanover, N. J., where the transmitting and recording equipment was set up in the telemetering room of the regulating station. The characteristics of the telephone lines which would be used between Hanover and Harrison were ascertained and then were simulated in the equipment at the Hanover station. Without making any adjustments on the equipment as received, we repeated the same tests which Bristol engineers had run in the factory to determine whether serious alterations were necessary. These tests were also satisfactory.

The receiving equipment was then shipped to Harrison where it was set up in plywood consoles and on plywood panels. And once again the same tests were run to ascertain whether any deviations had occurred in shipping or otherwise. The results, once again, were completely satisfactory, after a few initial adjustments.

The instruments are installed in plywood sections, as mentioned. In fact, the entire dispatching center will be located in a temporary wooden building. We feel that this arrangement will allow us enough time for experience in operating such a center and to make all necessary alterations in inexpensive materials, so that the permanent dispatching headquarters when constructed will be as efficient as possible. The permanent station is new being designed by Public Service engineers from both the gas and electric departments since it will centralize all dispatching operations for the company.

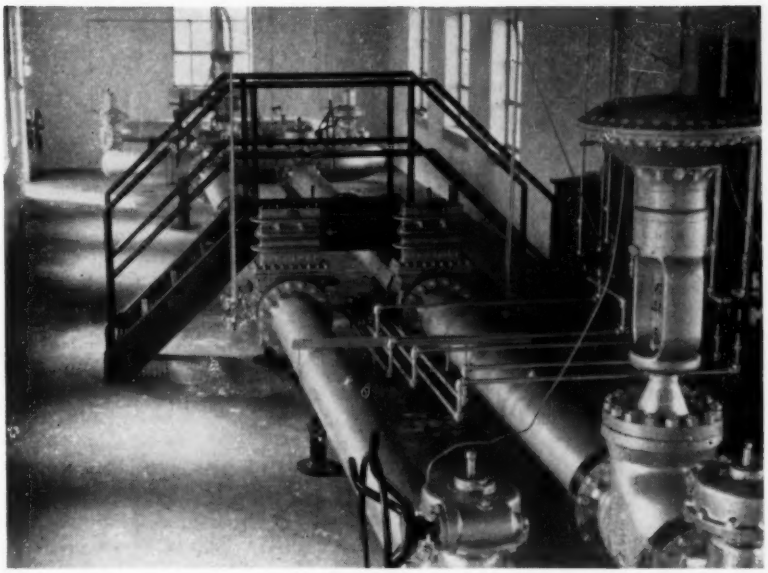
The Bristol computing system includes a number of instruments

Overall view of metering station at Hanover, N. J., where first trial computing system has been in operation. Meter runs with first and second cut regulators are located in center building, building at left houses computing equipment and regulators.

that basically take an orifice differential pressure measurement, correct it continuously for static pressure and also compensate for temperature, specific gravity, and deviation factor with manually set dials. It operates in the following manner: the differential pressure (h) at the orifice is measured by a Bristol Metameter flow transmitter (one for each meter tube), which extracts the square root of "h" and transmits it to a telemeter receiver. This flow receiver multiplies the square root of "h" by a meter factor (K), which converts the reading to Q reference. The meter factor contains all the usual constants of the basic orifice formula, plus a built-in reference pressure and temperature which is determined by the average conditions in the pipeline. Thus, the resulting figure represents a flow reading in cubic feet of gas *at the predetermined average conditions.*

A Dynamaster totalizer instrument then adds the flow readings from the two meter runs and gives a total reading of "Q reference." If the line conditions through the system were at predetermined average conditions of temperature and pressure, this "Q reference" would represent the total actual number of cubic feet passing through the system. Since these conditions are not usually at the average, however, they must be compensated for by additional instruments (see *Fig. 2*).

The actual pressure of the gas at the time of the flow measurement is measured in psia by a Metameter pressure transmitter. The square root of this pressure reading is then extracted and transmitted to a slidewire receiver, or pressure corrector. Here the value of "Q reference" received from the totalizer is multiplied by the square root of P and divided by the square root of "P reference." This pressure corrected value is then fed into a manual compensator instrument which compensates for the ambient temperature, specific gravity, and deviation factor by means of manually set calibrated dials. The final result appears on the calculator indicator and reads correctly in cubic feet of gas per hour



Two-tube meter station at Hanover, N. J.

at the standard conditions of 14.4 psia, 60°F flowing temperature. The reading of corrected Q is simultaneously retransmitted over telephone wires to the dispatching headquarters to a Bristol recorder and an integrator (see *Fig. 3*).

In addition to the readings on flow and total quantity of gas from any given station, the dispatcher requires information regarding known critical low points in residential areas served by the stations, which should be watched continuously during cold weather periods. There probably will be no more than two to four such locations in any given area, and readings of these pressures will be brought into the dispatcher's office and recorded on Bristol miniature telemeter receivers, equipped with high-low alarm set-points which actuate a ring-back alarm system.

Present plans call for a dispatching center with a number of panels, each covering operations served by a specific vendor. These panels will be made up to represent a group of metering stations; each station will be schematically diagrammed on the panel. Directly beneath the diagram, the specific recorders furnishing the information desired from each of the points in question will be installed. From these records, which show instantaneous conditions as well as the trends, the dispatcher will be able to take complete charge of the entire system by raising or lowering the set-points of the regulators at any given station so as to adequately serve the area involved. There will be a group of panels for each of the major vendors, to include all the stations served by that vendor (see *Fig. 4*).

The low pressure critical locations will be equipped with telemeter transmitters which will not only transmit readings to the dispatching offices, but to the metering station and to a manned distribution shop in the area. The personnel at the distribution shop will then be able to correct the conditions causing the low pressure in a given area quickly and efficiently, or other personnel in the area will be available for the dispatcher to send to repair the damage or alter the set-points of the various regulators if necessary. The telemetering transmission between low point and the metering stations and distribution station will be by standard leased telephone wires. The information going from the meter station to the dispatching office, however, will be by Hammarlund tone signal; thus the communication expense will be reduced.

The Hammarlund audio tone equipment can operate over any transmission medium including

Telemetering . . . Profitable operation within contract load is goal

microwave, radio, leased wire or telephone. In our case, we use the readily available telephone lines. A speech band over a normal telephone circuit covers a frequency range from about 300 to 3000 cycles. Approximately 24 audio tone signals can be spaced on one such circuit, allowing about 100 cycles between each tone signal. In other words, audible tone pulses of 550 cy frequency can be sent simultaneously with other pulses of 650 cy and 750 cy, and so on. When these frequencies are superimposed on a transmission circuit, the 24 functions can be sent simultaneously and independently, in either direction.

In our trial circuit, we have about 60 miles of leased wire between Hanover and Harrison, including the normal telemetering route, and an alternate. The alternate route is used as a private line for voice transmission while the normal route is serving as the telemetering circuit. In case of an outage on the normal line, the equipment at the Hanover station will switch to the alternate line automatically. This provides as much security as possible against complete outage. At the dispatcher's office there is a manual throw-in switch which he energizes in case of line failure. This manual feature insures that the dispatcher will know when there has been an outage, and will enable him to check on restoration of the service.

At present, we are using a total of 16 frequencies between the Harrison dispatch center and the Hanover metering station. Nine are being transmitted to Hanover from the dispatch center, while seven are being received from Hanover. Four of the frequencies from the dispatch center are used to operate the regulators at the metering station, with one pair for each valve. The dispatcher operates a toggle switch in either of two directions to raise or lower the regulator set-point. Four more frequencies are used in changing the range on the flow transmitter at Hanover to allow the dispatcher to use the recorders to their maximum accuracy, by spreading out the record to suit the flow. The ninth frequency is on at all times, holding in the relay in the normal transmission circuit. In the event of the loss of the frequency occasioned by the loss of the normal route, the automatic transfer to the alternate line takes place, as mentioned previously.

All frequencies from Hanover to the dispatch center carry signals from the Bristol Metameters. Since these instruments are of the impulse type, a tone pulse corresponding to the contact closure, which in turn is proportional to the measured variable, is transmitted to a matching-tone receiver at Harrison. The Hammarlund audio tone units provide a "Go, No-Go" type of operation. Either the tone is there or it is not; there is no dependence on shades or variations of frequency. Thus, the system is independent of line-voltage fluctations or storm interference.

Because of the "Go, No-Go" type of operation, the system can be readily tested in case of absolute failure of the tone signal. By using an inexpensive test panel, the dispatcher can quickly determine whether the failure lies at the transmitting or receiving end. If the fault is in the dispatch center, he can check out the five components involved and plug in a replacement center for the faulty unit. If the failure is at the transmitting end, an experienced serviceman can pinpoint the trouble there too, with the same type of test panel. With these test procedures, the equipment can be kept in operation with a minimum of outage time for equipment failure.

An important feature in the system concerns the remote set-point adjusting equipment. The toggle switch at the dispatcher's office, which raises or lowers the set-point of the regulator at the metering station, has a counterpart at the metering station itself by which the station operator can also raise or lower the regulator set-point. The switch at the station overrides the signal from the dispatching office in case of simultaneous operation, such as calling for a rise in the pressure from the dispatching office and a lowering of the pressure from the metering station. In this system it is impossible for both windings of the operating motor to be energized simultaneously.

A number of factors came into play when it was time to decide where to locate the central dispatching headquarters. The two primary considerations were the price of real estate and the cost of rented telephone lines. The southern part of the state was favored by the lower cost of real estate. However, the higher rates because of distance involved in communication lines would very quickly have offset the initially lower real estate values, and would have resulted in higher long-range operating costs. Considering all the factors, we decided to locate the permanent dispatching headquarters in Newark or its suburbs and bring in the telephone lines and tone signals to that location, since the major part of the company's load is concentrated in the northern section of the state.

Since placing the equipment at the Harrison dispatching center we have been in operation about 14 months, and the computing equipment has checked out at about 1.0 per cent accuracy, as compared with the Algonquin billing meters. This equipment has proved to be extremely valuable to us, and on the basis of these results we are placing orders with the Bristol Co. for eight additional systems.

We now have 12 fringe area stations for natural gas on the line and it is possible that all of these will eventually be instrumented with the same type of equipment. The permanent dispatching center will have room for the original 12 stations and several additional stations which are now foreseen.

Eventually every cubic foot of natural gas flowing into and out of the Public Service system will be monitored from the dispatching headquarters. ■

Pipe dreams become realities

By D. K. YORATH, President
Canadian Western Natural Gas Co. Ltd., Calgary
Northwestern Utilities Ltd., Edmonton

THE total proved recoverable reserves of natural gas in the province of Alberta as given in the January 1957 report of the Alberta Petroleum and Natural Gas Conservation Board, are 18.3 trillion cu ft. The present total estimated reserves for Canada run slightly over 22 trillion cu ft, with some 3 trillion in northeastern B. C. and the balance in Saskatchewan, Manitoba and southwestern Ontario. The Alberta Conservation Board estimates that, assuming a continuation of drilling and of gas discoveries per well, initial disposable reserves of 42 trillion cu ft can conservatively be expected by 1986, while, from a geological approach, an ultimate total reserve of 75 trillion cu ft may be forecast for Alberta.

Mr. Yorath made his prediction on June 25. Less than a month later, on July 15, Pacific Gas & Electric, San Francisco, announced a proposed $330 million super-inch pipeline to move natural gas from Alberta to northern—and probably southern—California markets.

Existing permits issued by the conservation board for the export of gas from Alberta total 5.75 trillion cu ft. In its report of January of this year the board estimates the reserves needed to meet the requirements of the province —to assure continued natural gas service to the peoples of Alberta over the 30-year period 1957-86 to be about 7.6 trillion cu ft (see *Table 1*).

TABLE 1.
NATURAL GAS RESERVES

	trillions of cu ft
Alberta—January 1957	18.3
Canada	22
1986	42
Ultimate	75
Existing export permits Total withdrawal	5.75
Alberta requirements 1957-86	7.6

It is absolutely essential that no additional quantities of natural gas be permitted to be withdrawn from the province unless the permit is contingent upon the Alberta market having prior call upon that gas if it is needed for Alberta consumption. The Alberta consumer must have that protection. As the major supplier to the natural gas consumers of this province, this is the stand that my companies will be taking before the board at any hearings involving requests for new permits to export gas or to hear application for increasing the amounts allowed under existing permits. At the same time I should say that our companies do not expect to buy gas from the producer at bargain basement prices but we are prepared to pay a fair price in line with the market prevailing at the time and having regard to all the factors involved.

Up until now nearly all the major natural gas reserves have been developed in connection with drilling for oil. I believe that the drilling for natural gas as the main object of discovery will be accelerated beyond the conception of anyone a year ago. If I am correct, and if the gas is there, it is possible the 42 trillion cu ft of reserves may be established before 1986.

We should now take a look at the rest of Canada and its appearance as a potential consumer of natural gas.

The population figures in *Table 2* are for areas lying along or adjacent to the systems of Trans-Canada and Westcoast. They do not include Alberta. The first figure includes Toronto but not Vancouver, now converting to natural

TABLE 2. POPULATION

(Adjacent to main transmission pipelines—not including Alberta)

Now served with natural gas	2,530,000
Now served with other gas	3,260,000
Not now served with gas	1,260,000
Total population	7,050,000

gas, but which is included in the second figure.

Then we follow on to the number of customers available from that population and we come to *Table 3*. This total potential is based on a market survey of 18.1 customers per hundred of population in the fifth year of operation. This saturation point of 18.1 compares to our companies' figure of 24.9. I feel that the 18.1 figure is realistic, though perhaps a trifle conservative, when considering the more intense competition the export markets will have from other fuels, than does Alberta. By export I mean those markets outside Alberta.

TABLE 3. NUMBER OF PROSPECTIVE CUSTOMERS IN COMMUNITIES

Now served with natural gas	324,000
Now served with other gas	387,000
Not now served with gas	564,000
Total present potential	1,275,000

And now I propose to give the crystal ball a real twirl. We shall look at the estimated capital cost of serving a population in excess of seven million and customers in excess of a million and a quarter. A few years ago I suggested that to bring the natural gas project to completion—by which I meant the serving of the million and a quarter customers—would cost in excess of $1 billion over the five-year period. I now want to revise that figure upwards and to suggest that a conservative estimate of capital expenditures between now and the end of 1961 could be at least $1.5 billion. *Table 4* gives the breakdown of this figure.

The major item of $629 million can be broken down into $545 million for the main transmission lines, $30 million for the major branch lines, and $54 million for the Alberta Gas Trunk Line system. This does not take into consideration the numerous small branch lines which will be required and which cannot be firmly determined at this time. The field gathering system includes compressors. The production facilities include processing plants.

TABLE 4. SUMMARY OF CAPITAL EXPENDITURES 1957-61 INCLUSIVE

Transmission	$ 629	million
Field gathering systems	25	"
Production facilities	95	"
Distribution systems	335	"
New Appliances	240	"
Piping, Installation & Controls	140	"
Total	$1,464	"

The distribution system estimate of $335 million has been arrived at on the basis of $400 per new customer in the fifth year of development and $200 for existing customers now served with manufactured gas or propane-air. For example, Toronto customers have been included in the latter figure.

New appliances was a really tough figure to arrive at. We assumed that 75 per cent of the new customers will install space heating equipment, 50 per cent ranges, 75 per cent water heaters, 10 per cent dryers and 1 per cent refrigerators and incinerators. This, to some extent, was based on our Alberta companies' experience though we have about 99 per cent saturation on space heating. If this guess is even approximate it should provide a much needed filip to the struggling Canadian gas appliance manufacturing industry, though, of course, as our manufacturing members well know, they will be exposed to strenuous competition from the appliance manufacturers across the border—indeed they are now.

The interior piping and installation figure, including cost of controls, is based almost entirely on the average residential customer and does not include the larger commercial and industrial. It is based on $17,000 per 100 new customers and $8000 per 100 customers already using some type of gas. This table will be further projected, later.

Before doing so, consider the Canadian gas appliance market as it now stands (*Table 5*). The first column is the actual and estimated unit sales (not dollars) for 1956—all the actual figures were not available—and includes appliances imported from the U. S. The second column is an estimate of the 1958 market which I suspect will prove to be under what the actual will show. These figures do not include dryers, incinerators or refrigerators.

Another supplemental chart which might be of interest is this one of the known capital expenditures of Canadian pipeline and utility companies for 1957 (*Table 6*). It is definitely low. There are some companies not included. B. C. Electric for example—but it is an indication of what is being spent for new plant and equipment today.

And now for the projection of capital (*Table 4*). The figure of $1,464,000,000 is conservative and one which I feel can be readily supported. Just for the fun of it I would like to give the crystal ball another twirl and see what we come up with.

Before doing so, I should say that my $1.5 billion *includes noth-*

TABLE 5. APPLIANCE MARKET

	1956 Sale	Estimated 1958 Sale
Gas warm air furnaces	43,075	60,000
Gas domestic boilers	3,500	4,000
Gas conversion burners	22,000	30,000
Gas floor furnaces and wall heaters	7,000	7,500
Gas space heaters	26,000	31,000
Gas cooking ranges	75,019	93,000
Gas hot plates	8,000	10,000
Gas water heaters	72,575	90,000
TOTAL UNITS	257,169	325,500

TABLE 6. 1957 CAPITAL BUDGETS OF CANADIAN COMPANIES

Alberta Gas Trunkline Co.	50,000,000
Canadian Western Natural Gas Co. Ltd.	2,985,000
Consumers' Gas Co. of Toronto	4,000,000
Dominion Natural Gas Co. Ltd.	2,500,000
Inland Natural Gas Co. Ltd.	25,000,000
Northern Ontario Natural Gas Co. Ltd.	1,000,000
Northern Ontario Pipe Line Crown Corp.	50,000,000
Northland Utilities Limited	750,000
Northwestern Utilities, Limited	3,000,000
Quebec Natural Gas Corp.	5,000,000
Saskatchewan Power Corp.	5,865,000
Trans-Canada Pipe Lines Limited	98,000,000
Union Gas Co. Ltd.	22,500,000
Westcoast Transmission Co. Ltd.	151,000,000
TOTAL	$421,600,000

ing for future population growth —it is applied to present population estimates only. It takes no account of additional projects or extensions other than those already announced. It does not include the conversion of large industrial customers. It contains nothing for the present facilities of those companies who have been serving customers with natural gas for many years, such as Union Gas, and nothing either present or future for our Alberta companies. It includes nothing for exploration, acquiring of gas rights, and other considerable but immeasurable items of this character.

This figure (1464) includes nothing for buildings to serve the 564,000 new customers. I feel that we can safely add $10 million for this item based on $1750 per 100 customers.

Table 7 just extends my first capital one with the unknowns which I think can reasonably be added. In a recent address given by A. P. Craig, president of Trans-Canada, he was quoted as saying that he knew of $200 million which would be put into new plants to be built in Canada because of the availability of natural gas. In another speech made recently, A. G. Bailey, vice president and general manager of Bailey-Selburn, looking into his crystal ball, forecasts a figure of $100 million for new well drilling in Alberta—but nothing for drilling elsewhere in Canada.

That is really adding in the unknowns—but I believe there is every likelihood that within the next five years a third pipeline exporting gas from Alberta will be built. Even disregarding Mr. Craig's $200 million—and please don't misunderstand me, I am not disparaging it, in fact I am sure he knows whereof he speaks—particularly when you think of all the natural gas by-products such as sulfur, propane and butane—I feel that an expenditure of capital directly attributable to western Canadian natural gas, within the next five to seven years, of $2 billion is reasonable — particularly when the Gordon Commission suggests that the expansion of the oil and gas industry might require during the next 25-year period a capital investment of $25 billion.

The next comparison is particularly intriguing—a comparison between the capital cost of the St. Lawrence Seaway project and the Canadian natural gas development (*Table 8*). Note I have used the conservative estimate of the natural gas program—but that I have added in the more optimistic figures from the previous table. You will also note the Seaway project includes $130 million for the U. S. portion where I have not included anything in the natural gas picture for U. S. pipelines built for the purpose of connecting with Canadian pipelines to take gas from Canada, or to sell U. S. gas to Canadian pipelines. The daily energy involved in the gas program (equivalent to over 1 trillion Btu) compares with 2,200,000 hp of the St. Lawrence project—which gives the gas development more than 7½ times the daily energy involved in the Seaway's plan. That is only taking into account the initial peak day potential of Trans-Canada and Westcoast of 1020 MMcf at 1000 Btu per cubic foot —with no regard to further increased capacity already being planned or for any other major transmission line projects.

Diverting attention for a moment from capital expenditures to operating, *Table 9* shows the annual costs of serving new customers—it has nothing to do with customers who are now burning natural gas — the calculation has been based upon the experience of the companies with which I am associated.

So far we have talked about expenditures and have said nothing of revenue. That, I do not intend to dwell upon. The Trans-Canada, Westcoast and Alberta Trunk pipelines have been financed. We know that such financing would not have been forthcoming had not the applicants been able to satisfy the investment houses, the insurance companies and the public that suf-

TABLE 7. EXTENSION OF EXPENDITURES

Capital Expenditures 1957-61 (see Table 4)	$ 1,464	million
New Administration Buildings, Shops, Etc.	10	"
New Industry (A. P. Craig)	200	"
New Drilling (A. G. Bailey)	100	"
Third Transmission Line (Canadian Portion)	180	"
	$ 1,954	million

TABLE 8. COMPARISON WITH ST. LAWRENCE SEAWAY

	Present Estimates	Probable Increase since Original Estimate	Total
	(in millions of dollars)		
Seaway—Canada Portion	$ 285	$ 15	$ 300
Seaway—U.S. Portion	100	30	130
Power Development	600	50	650
Totals	$ 985	$ 95	$1,080
Capital Cost—Natural Gas Program	$1,464	$ 490	$1,954

TABLE 9. ANNUAL COSTS OF SERVING NEW CUSTOMERS

Field Production Expense	$ 5 million	(excl. purchase gas)
Transmission Expense	9 "	
Distribution, Commercial, New Business and Administrative Expense	20 "	(new customers only)
Total	$ 34 million	

ficient revenue is there.

There is no doubt—in my opinion—that the acceptance of natural gas in the communities it is going to reach for the first time is going to be much more rapid than the forecasts we have had to date. This, I believe, is supported by the experience of B. C. Electric in Vancouver and Consumers in Toronto. For initial acceptance, natural gas is sold, like any other product, much more readily if it is cheaper and better than the product of its competitor. So far, both these factors have been the background of natural gas sales. I believe that over the years the price of gas is going to rise to the point where it may be just competitive with other fuels and if so will be selling itself on convenience, efficiency and quality alone. If, and when that time comes, I think it will still maintain its position in the fuel and energy market.

I know there is some concern as to whether natural gas will have an adverse effect upon Canada's other fuel sources. I do not believe it will on electric power. Gas, along with oil, has already had its effect on coal and, gas in turn, is bound to have a similar effect on oil where oil is used for heat producing purposes, particularly in the residential market. In this connection, we should remember that in most cases the oil companies are the producers of gas. In fact, I think in western Canada they are beginning to wonder which may be the most profitable of the products they have for sale. Electric power has and always will have a market which cannot be served by natural gas. This is borne out by the number of utility companies in the United States that sell both. I fear that natural gas in certain sections of Canada may have difficulty in making much headway against electricity in the domestic cooking field. Conversely it should, because of its economy, dominate in the commercial cooking field. Electricity so far cannot heat buildings economically in below zero weather, but natural gas can be and is being used to generate electric power.

I found *Table 10* most interesting. It shows the fuel energy use in the U.S.A. and Canada. You will note that Canada in 1953 so far as natural gas was concerned was in about the same position as the U. S. was in 1920. You will also see that in 1980 we will reach the U. S. level of 1955. Our rate of expansion, however, is somewhat more rapid — the U. S. reached her 26 per cent after 35 years, whereas Canada is expected to reach a similar figure in 27 years from 1953. I feel that the expansion of Canada's natural gas industry will be comparable to that in the U. S. over the past 15 to 20 years. The marketed production of natural gas in the U. S. has grown from 0.7 trillion cu ft in 1918 to 10 trillion in 1956 and 20 trillion is estimated for 1975.

Now that the financing has been arranged and construction underway, the chief problem left is to sell the gas. That can only be done by public promotion and education carried on continuously and by the utility company observing good utility practice.

New natural gas markets can only be obtained if the utilities serving those markets do so by maintaining an efficient and safe plant, operated with the highest standard of service and with constant regard for the convenience and comfort of its customers. The natural gas industry on the American continent has established a reputation of courteous and prompt attention to its customers' needs to the point where, as an industry, it is regarded with public confidence and respect common to few others. This standard must be maintained in the new markets.

Utilities are subject to government regulation. As such, the rate of return that they can earn on their rate base is controlled but in no way guaranteed. It would be impossible for me to delve into the various types of rate base here, and, without doing so, quoting percentage rates of return is almost meaningless. However, the allowed percentage rates in Canada vary in a range from 6½ per cent to 8 per cent. But the rate base can be established on a variety of approaches from depreciated original value to replacement cost new.

Our regulatory climate in Canada is good. I believe that all our commissions arrive at their decisions having in mind their responsibility to protect the public and also to ensure that the utility is allowed to operate so that its financial health can be sound enough to attract additional capital to meet the constantly growing requirements of its customers.

A major consideration facing the industry right now is the manpower situation, which over the next several months could become accute. Trained natural gas utility men in Canada are a comparative rarity—not only the technical men of department head or sub-department head level but also the key

(*Continued on page* 112)

TABLE 10. FUEL ENERGY USE

United States	1900	1920	1945	1955
Natural Gas (Incl. liquids)	Less than	4.4%	14.2%	26.0%
Petroleum	10%	13.3	30.5	41.0
Coal	90	78.4	50.6	29.3
Water Power	..	3.9	4.7	3.7
Canada		**1926**	**1953**	**Est. 1980**
Natural Gas		2%	4%	25%
Petroleum		10	42	45
Coal		69	39	16
Nuclear		..	..	..
Water Power		3	8	11
Wood		16	7	1

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"Consistent performance, first. It's the only sealed-operator gas valve with silicone, the fluid that gives uniform performance under all temperature conditions."

"So?"

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"That all?"

"Certainly not. All moving parts are permanently lubricated – sealed out of the gas stream. Gives my units dead-quiet operation."

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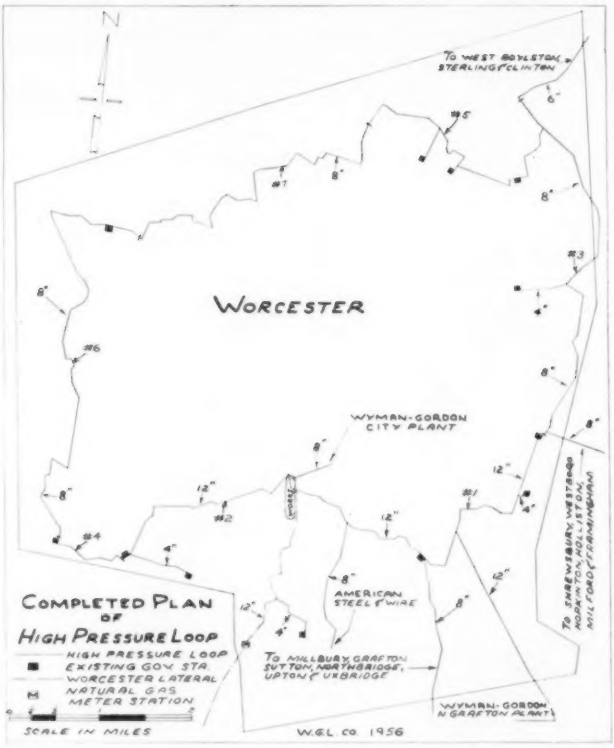
How to encircle a city with a high pressure loop

By JOHN P. LUTZ JR.
Superintendent of Distribution
Worcester (Mass.) Gas Light Co.



DURING the mid 1920's in the city of Worcester, Mass., the gas consumption and daily send-outs were increasing rapidly. It was realized that the existing low pressure system would soon be inadequate to supply the immediate and foreseeable increased consumption.

Surveys and cost studies were made on the overall low pressure system in the city. At this time there was also increased interest in city gas by suburban residents and industry in the outlying towns. The cost of laying additional large low pressure mains from the plant was prohibitive, so it was decided that a high pressure loop or belt line laid from the gas plant that would some day circle the city near the outskirts would be ideal. This would allow us to supply gas back into the low pressure system through district regulators and to better supply large industrial customers. We would also be in a position to extend high pressure mains into the surrounding cities and towns.

It was decided, then, in 1926 to bolster the pressure in several sections of the low pressure system and to plan for the extension of our mains into nearby towns.

Plans were drawn showing a tentative route of a high pressure welded steel belt line starting from the gas plant and extending across and around the outskirts of the city and back to the gas plant. The first two sections of this belt line were laid in 1927. Number 1 was a 4½-mile section of 12-in. steel main laid from the gas plant to the easterly side of the city. This section supplied high pressure gas immediately to two district regulators. Outlets were left to supply adjacent towns in the Blackstone Valley and a line to extend through several towns to our gas plant in the town of Framingham, 20 miles to the east. Section 2 was a 2½-mile line of 12-in. steel main laid westerly from the gas plant to immediately supply a large existing residential area through a district regulator.

The next year, 1928, lines were extended from section 1 of the belt line into the town of Millbury with a high pressure distribution system of approximately 16 miles of 2- to 8-in. mains. Also from section 1, lines were extended into the town of Shrewsbury and a high pressure distribution system of approximately 20 miles of 2- to 8-in. mains was laid.

Section 3 was laid in 1929 from the eastern end of section 1 with approximately 4½ miles of 8-in. to the northerly section of the city. This section immediately supplied one regulator and extended into the town of West Boylston with a distribution system and on to the city of Clinton to supply it with wholesale gas. In the next two years, lines were extended from Millbury into the towns of the Blackstone Valley and from Shrewsbury through the towns of Westboro, Hopkinton, and Holliston to our Framingham plant with a line into the town of Milford to supply them wholesale gas.

Section 4 was laid in 1935 from the end of section 2, approximately 1 mile of 8-in. main westerly to supply another district

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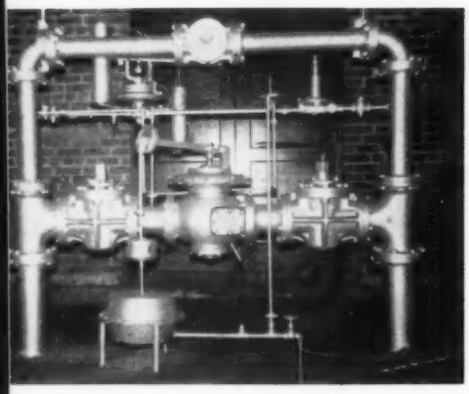
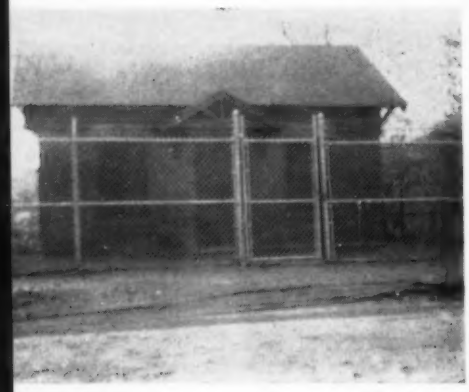


Above is a typical regulator installation on Worcester's system. Two types of regulator buildings are shown below.



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regulator and an industrial customer.

In 1941 the American Steel & Wire Co. expanded and enlarged its South Works wire mill and an approximate 1-mile line of 8-in. high pressure was laid from section 1 to supply the plant's needs.

Section 5, consisting of more than 3 miles of 8-in. main, was laid in 1947 from section 3 in a westerly direction to supply a large industrial customer and two district regulators.

Section 6, consisting of 5½ miles of 8-in., was laid in 1950-1951 from the end of section number 4 westerly and northerly to supply one regulator. This section was completed in time to permit us to use it and the rest of the belt line in sectionalizing our distribution system during conversion from manufactured 528-Btu gas to 1000-Btu natural gas, through the existing and several temporary district regulators.

In 1953 a 3-mile line of 12-in. was laid easterly from section 1 to the new Wyman Gordon Forge plant in North Grafton. Also in 1956, a ½-mile line of 8-in. was laid from section 2 to the Worcester plant of the Wyman Co.

Section 7—the last and final tie-in—was completed in the fall of 1956. It consists of approximately 4 miles of 8-in. main.

The entire belt line pipe is standard weight steel with welded joints tested to 100 psi. The line is graded with line drips at the low points and lubricated plug valves are installed on the line approximately 2500 ft apart. This gives us flexibility in case of emergencies as the gas can be pumped in both directions through the belt line from the gas plant.

This 25-mile loop has cost us approximately $665,000, ranging from $4.80 per lineal foot for 12-in. main in 1927 to $7.73 per lineal foot for 8-in. main in 1956. This includes easements where the line does not follow laid-out streets or highways.

Our 12 district regulators are in buildings aboveground and are located in most cases along the loop line, although several are located at ends of high pressure legs extending from the loop back toward the low pressure area to be supplied. These regulators are standard 6-in. x 6-in. and 4-in. x 4-in., double-disc, high-pressure-to-low-pressure balanced station regulators. They are also equipped with the Cleveland flow control that enables us to keep a rather low base pressure and yet will increase as the flow and demand increases.

As all these regulators dump gas into the integrated low pressure system, they are protected by safety devices consisting of a quick positive closing security valve on the high pressure inlet line underground in a pit. These are set to shut off when the downstream pressure increases to 14-in. wc or decreases to 3-in. wc.

Our three original regulator buildings are of red brick, 22 ft by 17 ft and 9½ ft high with an A frame roof. The others are prefabricated metal buildings 7 ft x 9 ft and 7 ft high, bolted to the foundation.

Our original pressure in the loop was only 8 psi and the first regulator buildings were sized to hold two district regulators. As the years went by and the sendout increased, the pressure has been gradually increased to approximately 40 psi, enabling us to use smaller and less elaborate buildings and the one regulator is sufficient for our needs.

Construction practices and methods have improved somewhat over the years. In the early years of the loop, welding was by the acetylene and oxygen method. Later the arc welding method was used. The first few sections of mains were protected with a coat of paint. The others are protected with mill-wrapped pipe with the welded joints coated with the same material.

This loop line has been a tremendous help in the growth of our Worcester division of the Worcester Gas Light Co. as the following statistics will show:

In 1926, sales of equivalent 1000-Btu gas were 610,604 Mcf compared with 1956 sales of 1000-Btu gas of 4,416,637 Mcf. The maximum daily sendout has increased from 2303 Mcf in 1926 to 21,875 Mcf in 1956. On Jan. 15, 1957 we reached a peak day of 29,170 Mcf. Customers have increased in this division from 39,845 to 45,918 since 1926. ■

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does the 7 big household services automatically
GAS takes the work out of housework. Entirely automatically, GAS cooks meals, heats water, incinerates refuse, heats and cools your home, refrigerates food, and dries clothes while you have more free time. GAS is modern, fast, clean, dependable, silent, safe, and economical.
Your gas company cooperating with your architect, builder, heating contractor, and appliance dealer will gladly tell you how economically GAS will modernize your home and bring new comforts and conveniences.
GAS is 7 ways better for the 7 big household services

The GEM Program consists of advertisements like the one above, *selling gas*, in the Saturday Evening Post, Small Homes Guide and Home Modernizing.

14 forward looking Suppliers to the Gas and LP-Gas Industry support the Gas Equipment Manufacturers national advertising program:

- American Cast Iron Pipe Co.
- American Meter Co.
- Bastian-Blessing Co.
- Cleveland Trencher Co.
- Fisher Governor Co.
- E. F. Griffiths Co.
- A. C. Lawrence Leather Co.
- Rockwell Manufacturing Co.
- M. B. Skinner Co.
- Sprague Meter Co.
- Superior Meter Co. Subsidiary of Neptune Meter Co.
- U. S. Pipe and Foundry Co.
- Vulcan Rubber Products Division of Reeves Brothers, Inc.
- Walworth Co.

Three years of consistent GEM national advertising has produced immediate and far-reaching results for the industry and for every GEM sponsor. More Suppliers to the Gas Industry are needed to help support this business insurance program.

Protecting and building present and future earnings of the Gas Industry is the responsibility of every manufacturer selling to it. All Suppliers to the Gas Industry are invited and urged to participate and profit.

As the Gas Industry Goes,
So Will Go the Business of
Every Supplier to the Gas Industry.

Suppliers:

For information on how you can participate, ask any GEM sponsor or write to Gas Equipment Manufacturers Committee, c/o Gas Appliance Manufacturers Association, 60 East 42nd Street, New York 17, N. Y.

Gas Companies:

FREE advertising mats for use in your newspapers and reprints for dealer mailing are available.

GEM price tags are available @ $10 per 1000 with room for appliance prices and terms on back.

16" Mechanical Joint Cast Iron Pipe for 8,000 foot feeder gas main in Illinois.

how long is long life?

With most products, it's a few years. With cast iron gas mains, a century and more of continuous service is common.

Proof? Old cast iron mains installed by 40 American gas utilities a hundred years and more ago are still being used. Hundreds more throughout the nation have passed their 50 year milestone in service. Each year adds to the total.

Cast iron might rest there. But modern metallurgy and design have made it possible to produce even better pipe . . . the modernized cast iron pipe being centrifugally cast today . . . with standardized mechanical joints that are bottle-tight under all distribution pressures.

Tougher, stronger, modernized cast iron pipe offers the gas industry long term economy and performance unequalled by any other pipe. Also it is ready for prompt shipment.

Count on Cast Iron for Service

- Standardized mechanical joints are bottle-tight for usual gas pressures . . . and for all types of gas.
- Centrifugally cast pipe is tough, strong and uniform.
- Joint design allows for deflection during and after installation.
- Service connections are easily made.
- Long life a matter of record.
- No shortage. Cast Iron Pipe is immediately available.

U.S. cast iron PIPE

CAST IRON

U. S. PIPE AND FOUNDRY COMPANY
General Office: Birmingham 2, Alabama

A WHOLLY INTEGRATED PRODUCER
FROM MINES AND BLAST FURNACES TO FINISHED PIPE.

GEM Sponsor

Gas Equipment Manufacturers adopt '8 out of 10 choose gas' as ad theme

A NEW theme, "8 out of 10 new homes choose gas," has been added to the "gas is 7 ways better" slogan of the national advertising campaign being waged by 13 leading suppliers of the utility and L. P. gas industries.

Now well into its third year, the campaign features large advertisements promoting gas in leading national consumer and shelter magazines and offers utility gas companies and L. P. gas dealerships opportunity to tie in on the local level. The entire undertaking is sponsored by the Gas Equipment Manufacturers Committee of GAMA headed by C. Benson Dushane Jr., American Meter Co.

Consumer education as to the benefits of gas is the primary aim of the program, but an attempt is also being made to reach architects and builders. Publications currently being used are *The Saturday Evening Post, New Homes Guide,* and *Home Modernizing.*

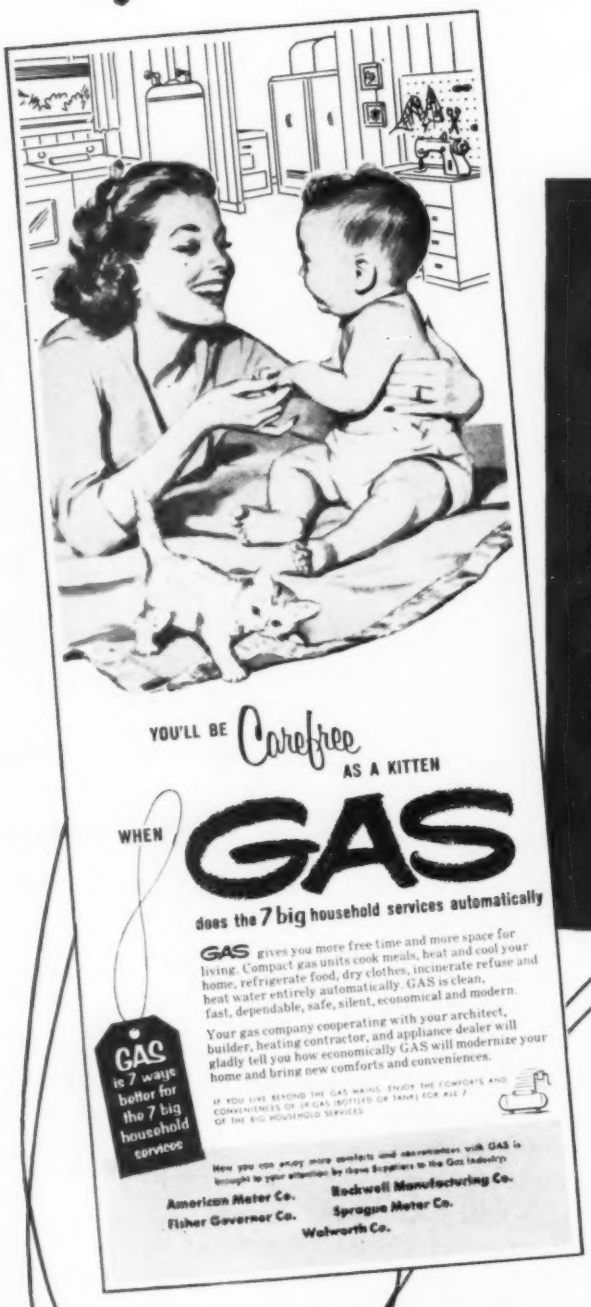
Headline of the attractive new ads is "8 out of 10 homes choose gas" with a secondary headline explaining "nearly 80 per cent of all new home buyers and builders select gas for heating and other household services." The body of the ad features copy which stresses gas as being automatic, dependable, silent, clean, fast, safe, economical, comfortable, and convenient.

All ads carry the now-familiar blue-and-white tag which carries the message "Gas is 7 ways better for the 7 big household services." In addition, the ads include "If you live beyond the gas mains, enjoy the comforts and conveniences of L. P. gas (bottled or tank) for all 7 of the big household services," and show a drawing of an L. P. gas tank.

To get the full benefit of the national advertising, individual L. P. gas and utility gas companies can tie in with the campaign

This is the special Gas Equipment Manufacturers Committee section of GAS. For the past three years, members of the GEM committee have been carrying on a national advertising campaign promoting gas—utility and L. P.—and backed by their own dollars. Now, as part of that campaign, these manufacturers will periodically purchase a special section in each of the L. P. gas and utility gas industry publications. This will allow them to present the GEM program, which allows opportunity for free utility and L. P. gas company tie-in on the local level, and to present themselves. GAS magazine and BUTANE-PROPANE News are proud to be the first two publications to carry this section.

If you believe in GAS..


YOU'LL BE Carefree AS A KITTEN
WHEN GAS
does the 7 big household services automatically
GAS gives you more free time and more space for living. Compact gas units cook meals, heat and cool your home, refrigerate food, dry clothes, incinerate refuse and heat water entirely automatically. GAS is clean, fast, dependable, safe, silent, economical and modern.
Your gas company cooperating with your architect, builder, heating contractor, and appliance dealer will gladly tell you how economically GAS will modernize your home and bring new comforts and conveniences.
IF YOU LIVE BEYOND THE GAS MAINS, ENJOY THE COMFORTS AND CONVENIENCES OF LP-GAS (BOTTLED OR TANK) FOR ALL 7 OF THE BIG HOUSEHOLD SERVICES
GAS is 7 ways better for the 7 big household services
Now you can enjoy more comforts and convenience with GAS is brought to your attention by these Suppliers to the Gas Industry
American Meter Co.
Fisher Governor Co.
Rockwell Manufacturing Co.
Sprague Meter Co.
Walworth Co.

National advertisements, paid for by these members of the Gas Equipment Manufacturers Committee, are helping every gas utility, dealer and manufacturer sell more gas, more gas appliances and more gas equipment.

American Cast Iron Pipe Co.
American Meter Co.
Bastian-Blessing Co.
Cleveland Trencher Co.
Fisher Governor Co.
E. F. Griffiths Co.
A. C. Lawrence Leather Co.
Rockwell Manufacturing Co.
M. B. Skinner Co.
Sprague Meter Co.
Superior Meter Co.
Subsidiary of Neptune Meter Co.
U. S. Pipe and Foundry Co.
Vulcan Rubber Products
Division of Reeves Brothers, Inc.
Walworth Co.

GAS is 7 ways better for the 7 big household services

Mats of GEM advertisements for use in your newspaper advertising are available at no charge.

..you'll invest in GEM

A small investment in the Gas Equipment Manufacturers national advertising program is a big investment in the future earnings of every GEM sponsor.

For the third consecutive year, the GEM Program is producing results for the industry and for every contributing manufacturer.

Telling the story of GAS to fast-growing America is a big and vital job—too big for the 14 GEM sponsors. Every supplier to the Gas Industry is urged to help and thus insure his future earnings.

For full information, write to the Gas Equipment Manufacturers Committee, c/o Gas Appliance Manufacturers Association, 60 East 42nd Street, New York 17, New York.

See Playhouse 90 on CBS-TV. Consult local listing for time and station.

Published as a Service to the Gas Industry by:

AMERICAN METER CO. EST. 1836 MEASUREMENT ENGINEERS

AMERICAN® METER COMPANY
INCORPORATED (ESTABLISHED 1836)

GENERAL SALES OFFICE: Philadelphia 16, Penna. • Albany • Alhambra • Atlanta • Baltimore • Birmingham • Boston • Chicago • Dallas • Denver Erie • Houston • Kansas City • Los Angeles • Minneapolis • New York • Omaha • Pittsburgh • San Francisco • Seattle • Tulsa • Wynnewood

IN CANADA: Canadian Meter Company, Ltd., Milton, Ontario • Calgary • Edmonton • Regina

SUPPLIERS TO THE GAS INDUSTRY for Ironcase, Tinned Steelcase, Aluminumcase and Welded Steelcase Meters • American-Wescott Orifice Meters • Instruments • Reliance Regulators • Apparatus • Valves

DIGS STRAIGHT

DIGS CLOSE

DIGS FAST

Etowah Construction Company uses its Cleveland 95's compactness and shiftable conveyor to advantage on this utilities job in Franklin, Tennessee.

The Cleveland 95 "Baby Digger"—built by the Pioneers of the Modern Trencher, originators of *every* important trencher design feature—makes money for its owners because it . . .

- ***fits more jobs***—digs to 5½' deep x 24" wide.
- ***digs all soils***—full-size engine, over 30 graduated power and speed combinations.
- ***digs faster***—more bucket capacity, more wheel-and-crawler combinations.
- ***saves property damage***—full crawlers, easy on lawns and sidewalks.
- ***lasts longer***—quality construction and materials mean longer life—it's in the records.

THE CLEVELAND TRENCHER CO.

20100 ST. CLAIR AVENUE • CLEVELAND 17, OHIO

Good Everywhere

on the local level by using one or all of four plans. These are:

1. Publish copies of the national ads in local newspapers. Free ad mats are available at no charge to all interested.

2. Use enlargements (30 by 40 in.) of these ads as floor and window displays. These enlargements are also available at no charge.

3. Mail proofs of the ads to general appliance dealers in the area who do not sell gas. Proofs are also free.

4. Use the attractive "gas is 7 ways better" appliance price tags which are similar to the tags featured in the ads. And, supply these tags to general appliance dealers in the area. Tags are available to L. P. gas and utility gas companies for a few dollars per thousand.

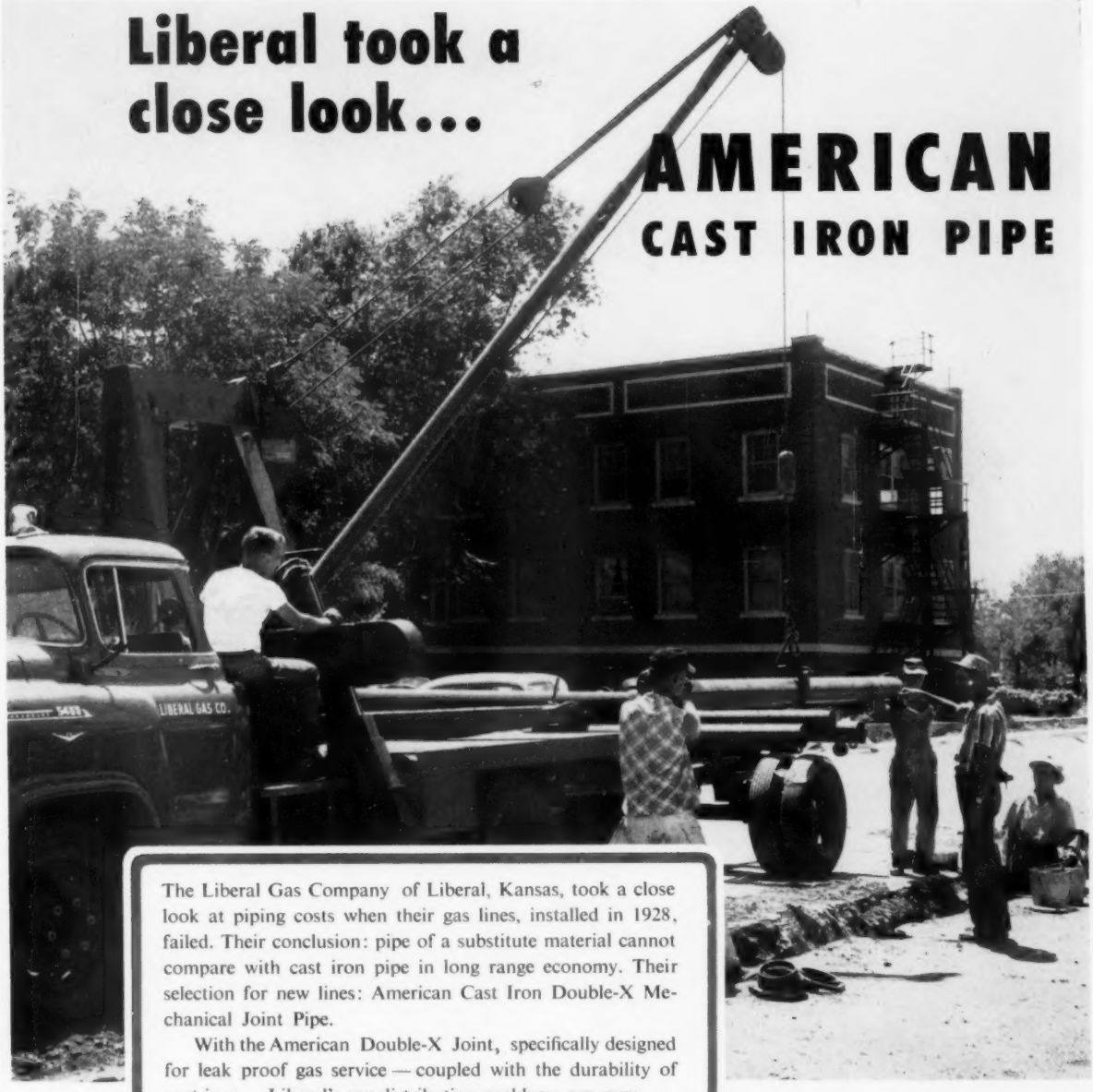
The entire cost of the program—the national ads, the tie-in material, and the trade magazine ads offering the tie-in material—is being borne by the GEM committee members. Current sponsors are American Cast Iron Pipe Co., American Meter Co., Bastian-Blessing Co., Cleveland Trencher Co., Fisher Governor Co., E. F. Griffiths Co., Rockwell Manufacturing Co., M. B. Skinner Co., Sprague Meter Co., Superior Meter Co., U. S. Pipe & Foundry Co., Vulcan Rubber Products, and Walworth Co.

With nothing to sell to the consumer themselves, the GEM committee members are sponsoring the advertising and promotion campaign "as business insurance for their customers and themselves." The committee calls the campaign "a coordinated consumer advertising campaign to drive home the great advantages of modern gas."

National magazine ads appear over the names of one or more of the sponsoring equipment manufacturers. The flexible program allows manufacturer participation to a large or small degree. Each sponsor selects the ads it wishes to underwrite from a large portfolio. The cost of running the ads might be paid for individually or in conjunction with one or more other sponsors. Approximately $300,000 was spent last year. ■

Liberal took a close look...

AMERICAN CAST IRON PIPE



The Liberal Gas Company of Liberal, Kansas, took a close look at piping costs when their gas lines, installed in 1928, failed. Their conclusion: pipe of a substitute material cannot compare with cast iron pipe in long range economy. Their selection for new lines: American Cast Iron Double-X Mechanical Joint Pipe.

With the American Double-X Joint, specifically designed for leak proof gas service — coupled with the durability of cast iron — Liberal's gas distribution problems are over.

The durability of cast iron pipe is proved by a century-long record of service in more than seventy American cities. This record is unequalled by pipe made of any other material. Because cast iron pipe lasts longer and requires fewer repairs and replacements, the annual cost over the life of the pipe is undeniably lower.

Take a close look at all the factors affecting piping economy when you specify pipe. Your American representative will be glad to supply facts for your consideration.

Liberal Gas Company installing Double-X mechanical joint pipe in Liberal, Kansas, replacing substitute pipe installed in 1928.

SALES OFFICES

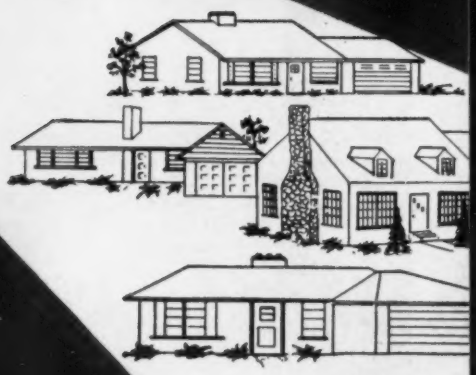
Kansas City • Denver
Minneapolis • Dallas
Pittsburgh • Orlando
New York • Cleveland
Los Angeles • Birmingham
San Francisco • Chicago

AMERICAN CAST IRON PIPE CO.
BIRMINGHAM 2, ALABAMA

GEM Sponsor

FISHER®

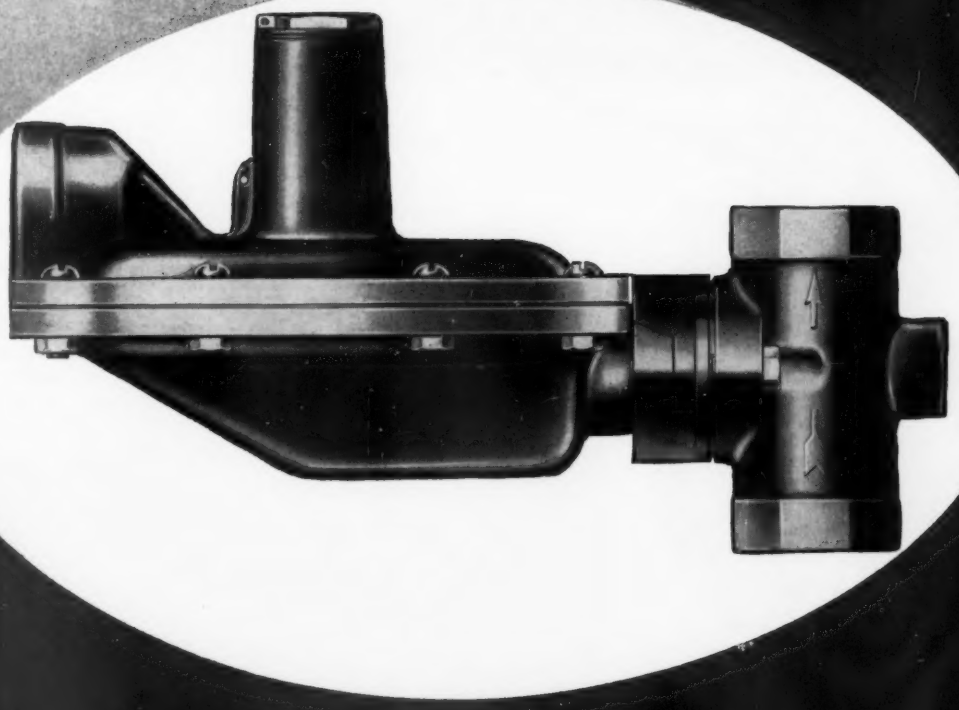
Series S-100



Finest in the industry!

FISHER
Marshalltown, Iowa

SERVICE REGULATORS



GOVERNOR CO PANY
dstock, Ontario

Maximum capacity pressure relief is now assured with this new Sprague Maximum Capacity Internal Relief Valve. It positively prevents houseline pressure from exceeding 2 lbs. P.S.I. in the event of regulator failure. The new Sprague Pulsation Dampener, now standard in all Sprague Combination top domes, allows maximum capacity flow through the tapped vent when necessary but in normal operation *dampens-out* the surging and pulsation common to large vents. Your present Sprague Combinations can easily be converted to maximum capacity relief with Sprague kits developed for this purpose. Contact our nearest representative for detailed information.

Sprague

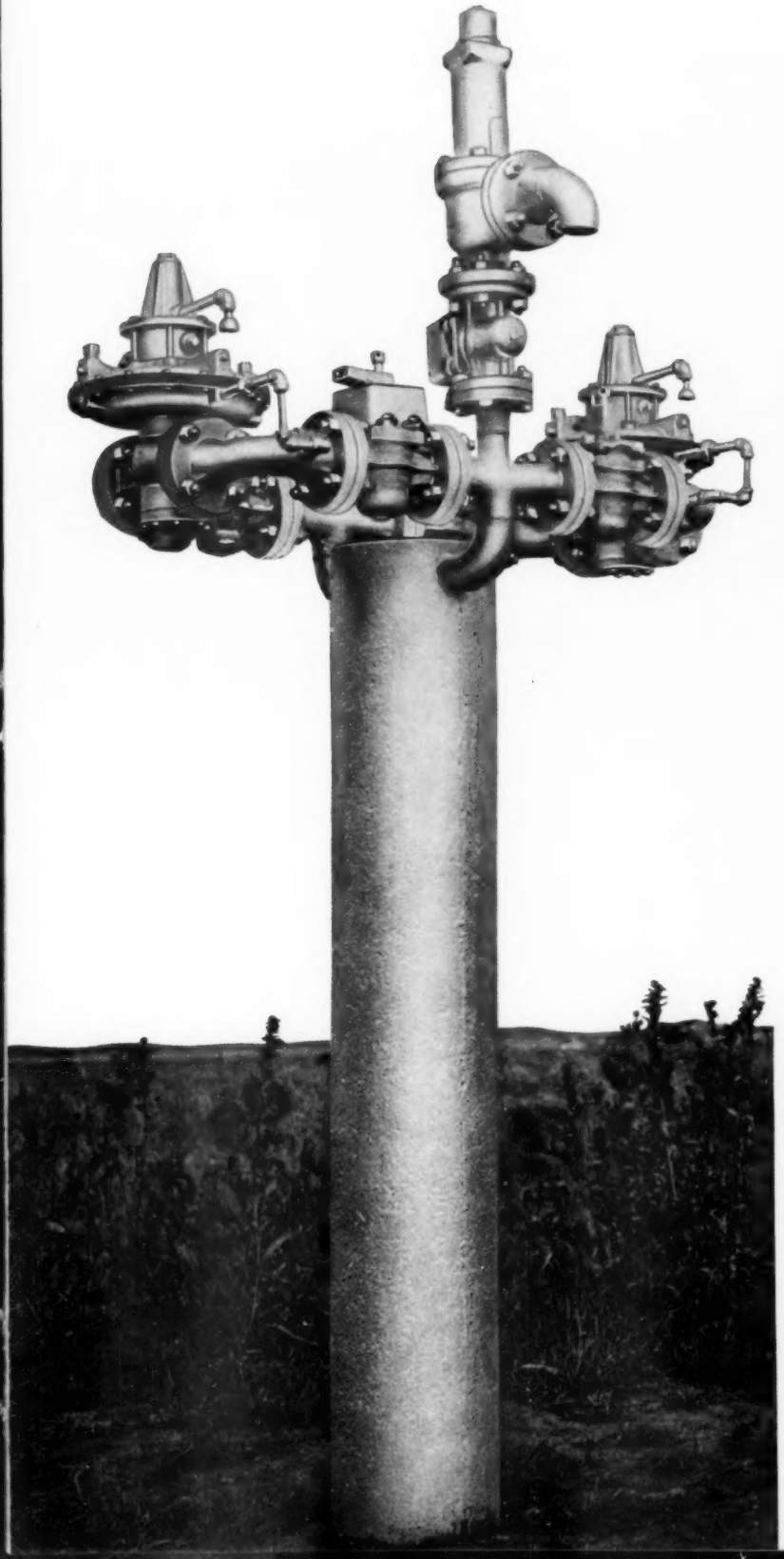
THE SPRAGUE METER COMPANY
BRIDGEPORT 4, CONN.

WESTERN BRANCH FACTORY — LOS ANGELES 23, CALIF. REGIONAL OFFICES — DAVENPORT, IOWA HOUSTON 3, TEXAS SAN FRANCISCO 11, CALIF.

GEM Sponsor

Why go down . . . when you can go up?

AND GET BETTER DISTRICT PRESSURE CONTROL



Why dig a costly vault when you have only a small distribution segment to serve from a high pressure line? Why not raise your pressure controls above ground and do the job quicker, better, more economically with Rockwell "1001" regulators and Rockwell-Nordstrom valves? There's no worry over tampering with this type installation. The Rockwell "1001" has a completely enclosed *power pilot* loading system. And Rockwell-Nordstrom valves can be fitted with locked hoods.

You'll get the highest degree of control accuracy with "1001" regulators . . . and at a most attractive price. Alert gas engineers find uses for them everywhere. They stock these versatile, compact, all-purpose regulators in anticipation of regular needs and emergencies. Write for bulletin 1059.

ROCKWELL MANUFACTURING COMPANY

PITTSBURGH 8, PA. Atlanta Boston Charlotte Chicago Dallas Denver Houston Los Angeles Midland, Tex. New Orleans New York N. Kansas City Philadelphia Pittsburgh San Francisco Seattle Shreveport Tulsa In Canada: Rockwell Manufacturing Company of Canada, Ltd., Toronto, Ontario

ROCKWELL "1001" REGULATORS

A Thousand and One Uses in the Gas Industry

IN the gas business you can't be half safe. The equipment you use, its installation and operation all must meet the highest security standards.

We at Rockwell carefully design and rigorously test our products with safety in mind.

One example: To resist impact, Rockwell meters are made with sturdy

SAFETY

A built-in bonus in Rockwell products

one-piece bowl type bodies. And they have but a single main joint to seal against leakage.

Another: Completely encased Rockwell regulators discourage tampering —protect against shock. Where the flexibility of outside weights is desired or where internal pressure relief is desirable, regulators with auxiliary safety controls can be recommended and furnished.

All Rockwell meters and regulators are tested before shipment at least double their rated working pressure. And all casting designs undergo a series of rupture tests at elevated pressures before release to production.

Because of such precautions, buyers of Rockwell equipment enjoy the peace of mind that comes only through use of the finest, safest equipment. Rockwell Manufacturing Company, Pittsburgh 8, Pa.

FOUR WAYS IN WHICH ROCKWELL EXCELS

RESEARCH • **SAFETY** • **ACCURACY** • **SERVICE**

ROCKWELL GAS METERS AND REGULATORS

The gas industry and the public mind

By J. FRED EBDON, Editor

BUSINESS is complicated in these modern times. Used to be, a company with a good product or service at a reasonable price could depend on that to carry the business through expansion leading to a well-established, progressive industry. Now, factors such as the pseudo-scientific research, opinion polling, slick advertising and organized mass-promotion, through several media, have to be brought into play.

Such factors are aimed at penetrating or "capturing" the public mind. And the public mind is important to our industry, just as it is to any industry. Recent developments during legislative efforts to write and pass a new gas bill adequately point this out. The public mind relative to the gas industry is currently in a state of suspense.

Competing industries have been inclined to more or less shotgun efforts to bring public thinking in line with their own thinking. That is, they use a rather broad basic attack. As is the case with most campaigns for a spot in the public mind, the offensive is mounted from bastions of money. The money is the prime ammunition.

Thus we have seen the electric lighting and power industry pretty well sell the idea that electricity is cheap and that it isn't really modern if it isn't electric. Other fuel industries have tried—with piddling success—to apply this technique. There is little fault to be found in these efforts. Industry is after public thinking. They are attempting to capture part of the public mind.

In all credit to our electric friends, they did a good job of it. And to no credit of the gas industry, we sat pretty still while they were doing it. Words, yes, there were plenty of those from the gas industry—but little of anything else. This was true until very late in the words-and-paper "battle."

Most of the campaigns for the minds of the public are channeled through various advertising media. Some effort is usually made to develop name or symbol association with a product. This is very well for the subordinate companies in an industry. But, where does this leave the industry?

It is one thing for a company to sell a product and quite another to sell its industry. Some of our competing industries took up the sale of their industry prior to the gas industry's efforts in that behalf. Or, possibly, the gas industry's planned program was less effective.

Now, the gas industry has a double-faceted problem in selling itself to the public. It has the educational aspect in the services that it can render to consumers and it has the difficult task of overcoming a misguided conception that gas appliances in the laundries and kitchens of modern homes are a bit passé. This idea was "sold" by competitive industries; and, regardless of the inherent absurdity, the minds of the general public now have to be resold on the gas industry.

The basic psychology of advertising in an industry's behalf is complex when it is desired to measure effectiveness. It is well known that simply repeating over and over again a name, service, brand, or product can be quite effective advertising. If you tell someone something often enough, he will sooner or later start to believe you and, the odd thing is, you will start believing it yourself. This is not unlike some of the ad campaigns that the gas industry has been faced with from smart competition.

On the other hand, the sophisticated advertising campaign, using appropriate media, can be equally or more effective. It has not been the good fortune of the gas industry to escape this type of campaign for the public thinking from, again, very proficient competition.

Doubtless, the campaigns for the public mind in relation to energy supply in the homes of America to produce modern, efficient accomplishment of the more basic, classical household tasks, have been swayed by the country's passage into the electro-jet age. Gas industry operations have certainly kept pace with the advent of technical times. But, did they get this message to the public mind? At times, when one sees the extent of electric cooking and refrigeration — even air conditioning— in the homes of gas industry employees, one wonders if the gas industry itself ever got the message.

Certainly some gas companies did. Probably the majority did. And these companies have been at the forefront in the gas industry's fight for the public mind. They have done well. All credit to them, but their efforts were at best limited.

Certainly, the local scene is important. It is a "must" of an industry that is attempting to sell itself. However, the local effort relative to gas industry sales effort usually concentrates on the local company or on direct appliance promotion. The gas industry, per se, comes in for a very thin slice of this cake.

What was, and still is needed, is the tie-in of the industry, its commodity—gas—and its service. The local and national programs to capture and mold minds have to be mutually supporting, as far as objective is concerned. If they are otherwise mutually supporting, so

much the better. In fact, this concept is essential. The gas industry will prosper only so long as the individual companies and segments prosper.

Several programs have come over the horizon to get gas industry back on the track in public thinking. Gas men have known all along that the industry has *modern appliances* for sale through dealers, contractors, and through the gas companies themselves, in some cases. They realize these appliances take second to none. They answer the conditioned, reflexed thinking of the average American housewife with their automation. They shine lights for her to tell her the burner is "on." They jingle and whistle, shut "on" and "off" and modulate automatically, and really do a technically good job. Yes, the gas appliances are here. They simply need to be sold as modern along with the selling of the industry as modern instead of some latter-day coal industry that is sinking or is due to sink below the industrial horizon.

The PAR program and its promotions have gone a long way toward conditioning the public acceptance of gas service and the modern gas industry. The "Playhouse 90" campaign is doing an outstanding job of selling the industry and the applications of its basic product in the modern home. And the media is right for the exploitation phase through the services of a name eye-catcher.

Still another promotional program has come to the forefront of industry respect during the last three years. The Gas Equipment Manufacturers Committee of GAMA has been doing the type of thing we have been talking about. Hitting the public mind on its own ground — the popular consumer magazines—with a sparkling advertising campaign. This series of ads carries into the homes and directly to that great pampered group of button-pushers, the housewives, that spend more time and effort being "automatic" than they do facing the realities of convenience, cost, safety and cleanliness. (We wouldn't have it any other way.) She is the person that should be sold. She will, in turn, sell the husband if she wants whatever she wants badly enough. Lately, the gas industry has had a hard time convincing her she wants gas service and appliances in her kitchen and laundry badly enough.

Our job then is reselling gas and its many services to the home owners and appliance users. This the GEM program is doing. It is not something that may be done. It is being done. Perhaps you have seen the extensive campaign in *The Saturday Evening Post*, or *New Homes Guide*, or *Home Modernizing*. If you haven't you should look them up. Follow this carefully planned and executed program.

Members of the GEM Committee are manufacturers and suppliers to the gas industry. They are not selling their products through GEM advertising. In fact, they have nothing to sell the average consumer. To the contrary, they are doing what the gas industry itself has been trying to do—sell the gas industry so that it is firmly imprinted on the public mind. They are backing up the gas industry's own objective as a reflection of the confidence major suppliers have in the industry's future.

"Gas is 7 ways better for the 7 big household services" is the theme that GEM is filtering into the public mind through the aggressive advertising program. And this new jewel is not limited to natural and manufactured gas service. It makes the LP-gas segment full participating partners. Consumers are getting a campaign beamed at the consumer level that shows a unified gas industry. The bottle-gas and utility gas companies are shown linked, as they should be. Gas service gets all of the attention in the well-designed, adequately placed space campaign. The copy tells the message of convenience and modernity of gas appliances and the dependable, safe fuel service that backs them up.

Though consumer education is the prime objective of GEM, its program extends to architects, craftsmen, heating and air conditioning contractors, and others in the building trades through more vertical publications and, to a limited extent, through trade journals. The coming generation is not overlooked, either.

GEM's promotional activities are not confined to the national level. To the contrary, here is what is being done on the local level:

(1) Gas companies are using reproductions of the GEM *Saturday Evening Post* ads—over their own names—in local newspapers. The GEM Committee will continue to make newspaper mats available at no cost.

(2) Gas companies are continuously sending their customers, dealers, heating contractors, etc., reprints of various GEM-sponsored ads. GEM will continue to make limited quantities of the reprints available to the gas industry at no cost.

(3) GEM price tags—as shown on each advertisement—are being used in the showrooms of dealers, contractors, and utilities. These tags have space for prices and terms. They are available at cost ($10 per thousand), or in a trial lot up to 50 copies at no charge.

The GEM program is your program, but the cost is underwritten by respected suppliers to the gas industry. The manufacturers back the GEM campaign with their combined power, prestige, and money. They have that much faith in the further progress of our industry. They deserve our support and thanks. Are you taking full advantage of this altruistic package? ■

ROBERT S. STEVENSON

Portrait by Fabian Bachrach

"At Allis-Chalmers we believe that we can do our fellow-employees no greater favor than to recommend that they invest in a 'nest-egg' fund of U.S. Savings Bonds.

"While this program has been going on for many years—made easy through the Payroll Savings Plan—we recently offered all Allis-Chalmers people a chance to review their individual bond purchasing schedules and to bring them up to date.

"As a result, more than 52% of the total Allis-Chalmers organization of about 40,000 people are buying U.S. Savings Bonds at a rate of approximately $6,000,000 a year."

ROBERT S. STEVENSON, *President*
Allis-Chalmers Manufacturing Company

Start your employees on the path of future financial security through automatic savings in the new and improved Series E Savings Bonds. It's simplicity itself. Just contact your State Director, U.S. Savings Bonds Division. He'll provide all the material and assistance you need to install a Payroll Savings Plan or build enrollment in one already existing. Look him up in the phone book or write for full information to the U.S. Savings Bonds Division, Treasury Department, Washington, D.C.

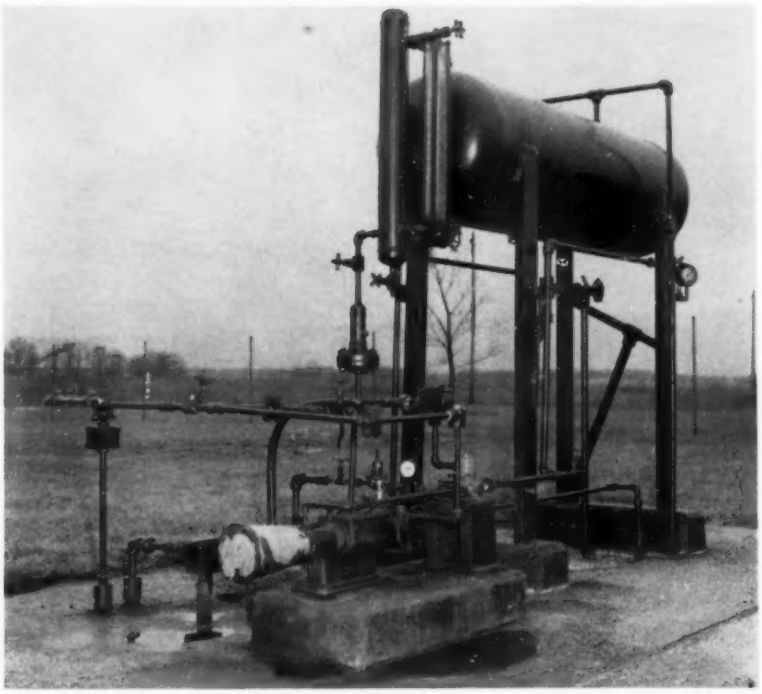
The United States Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and

GAS MAGAZINE

TODAY—PAYROLL SAVINGS ENROLLMENT IS AT A NEW PEACETIME PEAK!

Operating experiences with pump-type odorizers

By L. RAYMOND BILLETT
Northern Illinois Gas Co.,
Bellwood, Ill.



Northern Illinois Gas Co.'s first odorant pump installation. Pump is a Proportioneers' Treet-O-Unit.

Northern Illinois Gas Co. has experimented with pump-type odorizers for several years. The company feels that the pump-type unit does a superior job of proportioning odorant flow to gas flow. Here are the results of the experiments.

IN order to present a background to the experience of the Northern Illinois Gas Co. with pump-type odorizers, it would be well to give a brief summary of company history and operation in regards to odorization. Our company serves approximately the northern third of the state of Illinois exclusive of the city of Chicago. We serve most of the rapidly growing suburbs and many industrial cities in the greater metropolitan area.

Prior to 1931, we were a manufactured gas company. In 1931, the Natural Gas Pipeline Co. of America started delivering natural gas into the Chicago area. At that time, two small areas of the company were converted to straight natural gas. Our odorizer experience started when drip-type odorizers were installed at the tap stations serving these areas. The remaining company territory

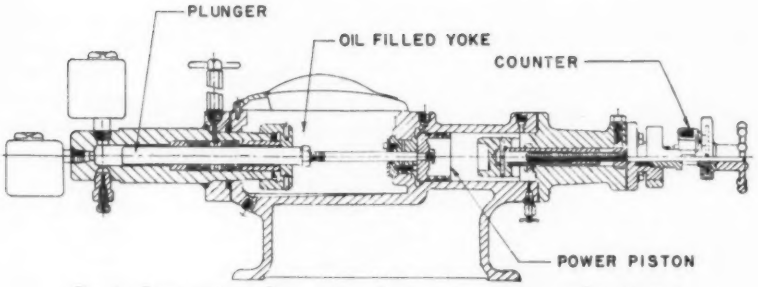


Fig. 1. Cross section of gas powered pump — stroke manually adjusted.

was converted to an 800 Btu mixture of natural gas and coke oven gas which was purchased from the Peoples Gas Light & Coke Co., which serves the city of Chicago.

In 1946, the Natural Gas Pipeline Co. completed a second pipeline parallel to the first which doubled the natural gas available and the Northern Illinois Gas Co. elected to convert its entire system to natural gas. This conversion took place during the years 1947-1950, and many tap stations had to be built to supply the natural gas to our system.

Natural Gas Pipeline Co. delivers its gas to the Chicago District Pipeline Co. at Joliet, a city some 50 miles southwest of Chicago. Chicago District Pipeline Co. transports the gas from Joliet to Chicago, and because its pipeline runs through a suburban territory, the gas is odorized.

In 1951, the Texas-Illinois Pipeline Co. made gas available at Joliet. We now find ourselves receiving gas from three pipeline companies, two of which deliver unodorized gas and the third with odorized gas. At the present time, we have 35 points of delivery from the pipelines.

The majority of our odorizers were installed during the conversion period from 1947-1950. The company installed, or has had installed at one time, the following types of odorizers:

1. Drip
2. Drip with float control
3. Meter
4. Sweep
5. Modified bypass wick

Our experience has indicated that an increase in the odorant rate above normal results in an excessive number of customer complaints; the majority of which are nuisance complaints rather than leaks. On the other hand, too low an odorant rate results in unsafe operating conditions. It was found after almost 20 years

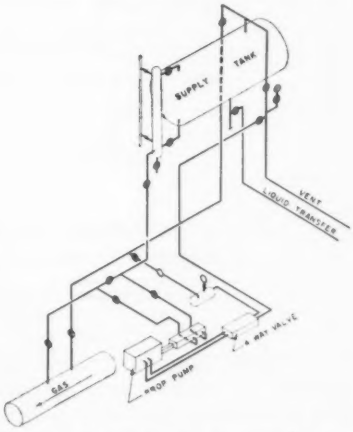


Fig. 2. Piping layout of manually controlled pump.

of experience that the five types of odorizers mentioned above had as their principal shortcoming the inability to maintain a constant odorizing rate over a wide range of flow and temperature. The Northern Illinois Gas Co., therefore, elected to try a positive displacement odorant pump in an effort to overcome this shortcoming.

The opportunity for the initial installation presented itself in 1951 when the Texas-Illinois Pipeline Co. made more gas available in the Chicago area. It was decided to use a positive displacement pump on this new supply at our Station 143 located in Volo, Ill. During the winter months, this gas was to be delivered to our distribution system at a minimum flow of 500 Mcf/hr. During the summer months, this gas would be sold to a nearby electric generating station as boiler fuel at a maximum rate of 3700 Mcf/hr. During the spring and

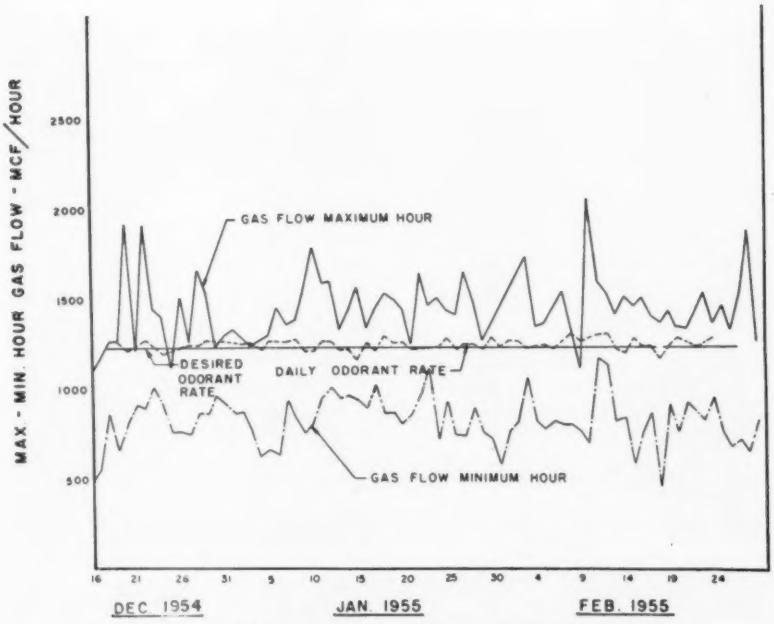


Fig. 3. Odorant rate and gas flow each day of test.

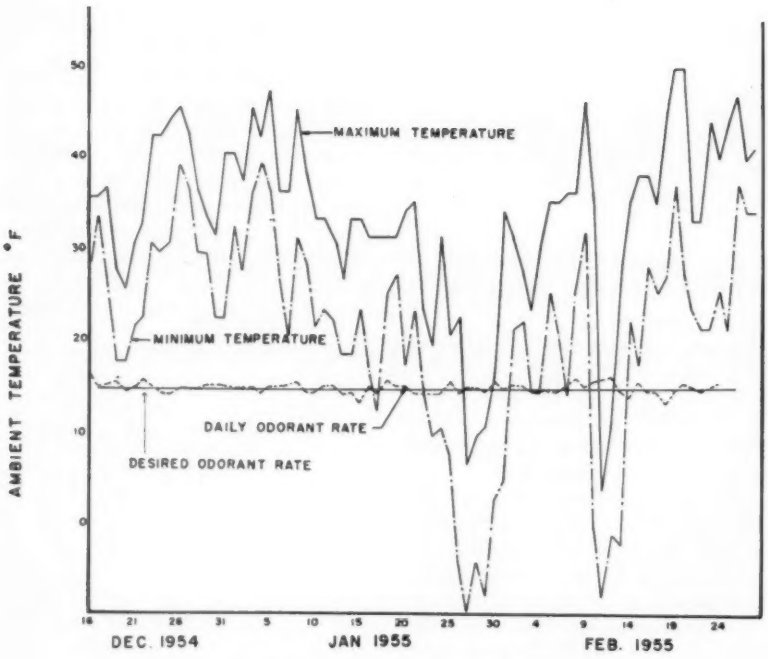


Fig. 4. Odorant rate and temperature each day of test.

fall months, the flow might be changed hourly or switched back and forth between the distribution system and boiler gas as the weather dictated.

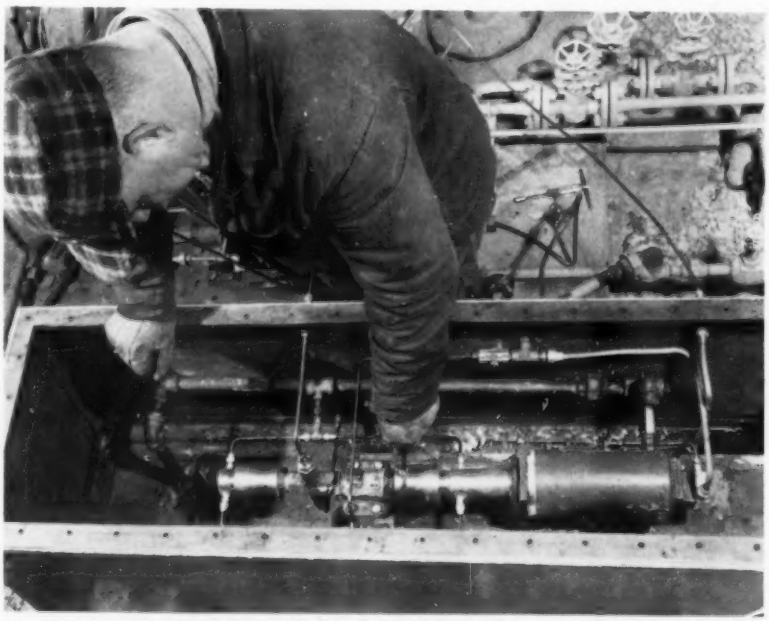
Boiler gas had been available through Station 143 before the advent of the third pipeline so this station already had an operator on duty 24 hours a day. In the selection of the positive displacement pump, therefore, no attempt was made to make the quantity of odorant automatically change as the gas load changed. Rather, the prime consideration in selecting our first positive displacement pump was a high degree of reproducibility and ease of adjustment.

The unit selected is powered by gas but controlled by electricity. It has both the length of stroke and the frequency of stroking controlled manually. As shown in *Fig. 1*, the pumping end consists of a 0.50-in. diameter stainless steel plunger operating in a stainless steel measuring cylinder. The packing between the cylinder and plunger consists of square teflon rings with graphitor plunger bushing and stuffing. Pressure is applied to the packing with a screw-type gland follower. Externally mounted spring loaded ball check valves at the inlet and outlet ports complete the pumping unit.

The plunger is directly connected to an impulse motor which uses gas at a pressure of 50 psig as the operating media. A four-way valve alternately applies power gas on one side of the impulse motor piston while the other side of the piston is connected to a flare. The four-way valve reverses the power gas and flare connections to drive the impulse motor on its return stroke.

The length of stroke is changed by adjusting a piston stop. The adjusting screw of the piston stop is of the non-rising stem type so that a dashpot or dampening effect can be maintained at each end of the piston stroke regardless of stroke length. A small direct reading counter is geared to the adjusting screw handwheel. The purpose of the counter is to allow the operator to adjust the stroke to any desired length accurately. The adjusting screw and counter are geared together so that .01-in. change in the stroke length makes a difference of 1 in the counter reading. The counter is set to read 000 at no stroke and therefore reads 100 at a 1-in. stroke and 200 at a 2-in. stroke. Practical application indicates that the pump stroke can be changed in .01-in. increments from a minimum stroke of .4-in. to a maximum stroke of 3-in. In our application of this pump, the stroke length is changed only on a seasonal basis and only 1-in. and 2-in. stroke lengths are used.

The operating of the four-way valve is controlled by a solenoid.



Northern Illinois workman inspects gas odorant pump in pressure-tight case.

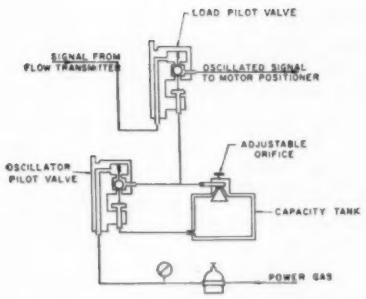


Fig. 5. Schematic diagram of pneumatic oscillator.

The solenoid is alternately energized and de-energized by a variable speed contractor located in the station office. The contractor consists of an electric motor driving a variable speed transmission. The output of the transmission drives a cam which in turn contacts a snap action switch. By the simple expedient of turning an adjusting handwheel the operator can select an infinite number of speeds between a minimum of 1 stroke per minute and a maximum of 36 strokes per minute. With the equipment selected, and using the full available operating range of both the stroke length and stroke frequency, 1 lb of odorant per Mcf can be injected into gas flowing between the rates of 136 Mcf/hr and 36 MMcf/hr. As stated before, this unit is used on a line that has a minimum flow of 500 Mcf/hr and a maximum flow of 3700 Mcf/hr. At the lowest flow a 1-in. stroke is used with a frequency of 1 1/3 strokes/minute. At the highest flow a 2-in. stroke is used with a frequency of 9 strokes/minute.

The center yoke of this pump is filled with oil. This oil receives the odorant which wets the plunger as it moves back and forth through the packing. The operator checks the oil in the yoke once each shift and we have found that under normal operating conditions the oil becomes sufficiently contaminated with odorant to require changing in about a week's time. As the necessity for oil changes becomes more frequent the packing gland is tightened, which usually restores the pump to its original condition. Experience has indicated that a complete overhaul is necessary every two years at which time the plunger and packing are renewed. New piston rings and "O" ring seals are also installed in the impulse motor at that time.

In *Fig. 2* the necessary piping for this unit is shown. Notice that the piping is relatively simple and that no orifice plate is required for gas measurement at the odorizer. Not shown in *Fig. 2* is a back pressure regulator in the vent line which keeps a slight positive pressure on the odorant supply tank.

Although our first installation works very satisfactorily, it has the obvious disadvantages of not automatically following the change in gas flow, and requiring an electric supply. Late in 1951, Harold Burgart of the Northern Illinois Gas Co. set out to design a pump-type odorizer which would overcome these disadvantages. The component parts he recommended were already available from various manufacturers. These recommendations were turned over to a pump manufacturer in Chicago, and the pilot installation was made in 1954. Although the pump is automatic, the first unit went on test at an attended station so that complete performance data could be gathered.

The data taken are represented graphically in *Figs. 3* and *4*. *Fig. 3* shows the daily odorant rate and the maximum and minimum hourly gas flow for the duration of the test. The maximum flow was 2030 Mcf/hr while the minimum flow was 460 Mcf/hr. While the gas load was undergoing these fluctuations, the daily odorant rate varied only .03/MMcf. *Fig. 4* indicates the maximum and minimum ambient temperature during the test period. It can be seen that the temperature varied from 51° to —10°. This test indicated that the odorizing rate of this unit was affected less by changes of gas flow and temperature than any other unattended odorizer the Northern Illinois Gas Co. had in service.

In this installation an orifice plate is used to measure the gas flow. A pneumatic flow transmitter converts the differential pressure created by the orifice plate into a variable pneumatic signal. A pneumatic flow transmitter differs from a differential pressure transmitter in that its pneumatic output varies directly as the flow while the pneumatic output of a differential pressure transmitter varies directly as the differential pressure.

This variable signal is transmitted to the positioner portion of the driving motor through a pneumatic oscillator. The purpose of the oscillator is to produce a square wave of pressure at a constant, predetermined, manually adjusted frequency. In this case, it varies the pressure to the motor positioner from 0 to

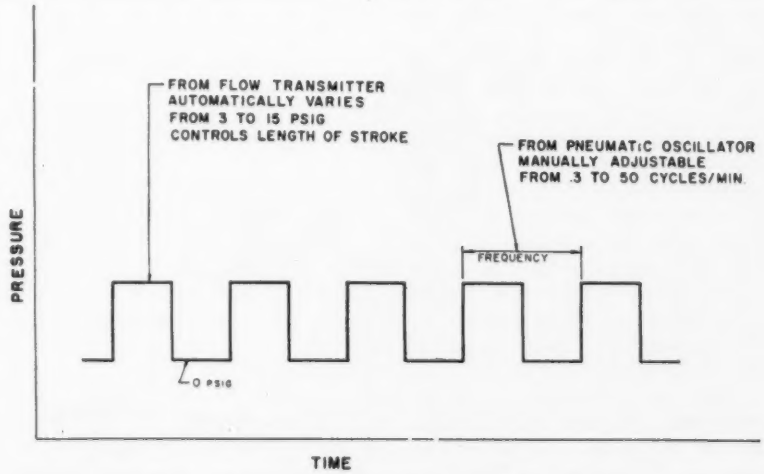


Fig. 6. Diagram of signal received by motor positioner.

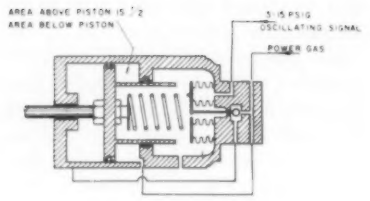


Fig. 7. Pump motor.

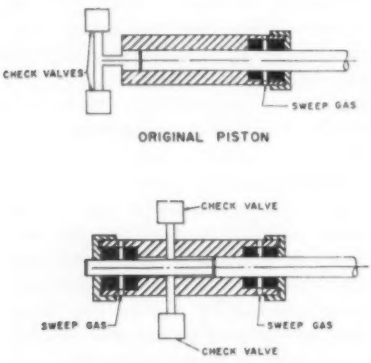


Fig. 8. Modified piston.

the signal value. Each pressure cycle from the oscillator causes the motor to stroke and return while the magnitude of the signal determines the length of the stroke.

Fig. 5 shows diagrammatically the operating of the pneumatic oscillator. It consists of a pilot relay valve, an adjustable orifice and a capacity chamber. The pressure bellows of the oscillator pilot valve has a special snap action characteristic in that when the pressure in it reaches approximately 6 psig it undergoes a large deflection which causes the pilot valve to close the inlet port and open the exhaust port. As the pressure in the bellows is reduced it undergoes a large deflection in the opposite direction when the pressure reaches approximately 5.7 psig, again causing operating of the pilot valve. In this position the pilot valve opens the inlet port and closes the exhaust port. This pulsing of the oscillator circuit continues as long as power gas is applied. By manually adjusting the restriction it can be seen that the oscillator circuit can be made to change its frequency. The operating limits on the frequency are from .3 to 50

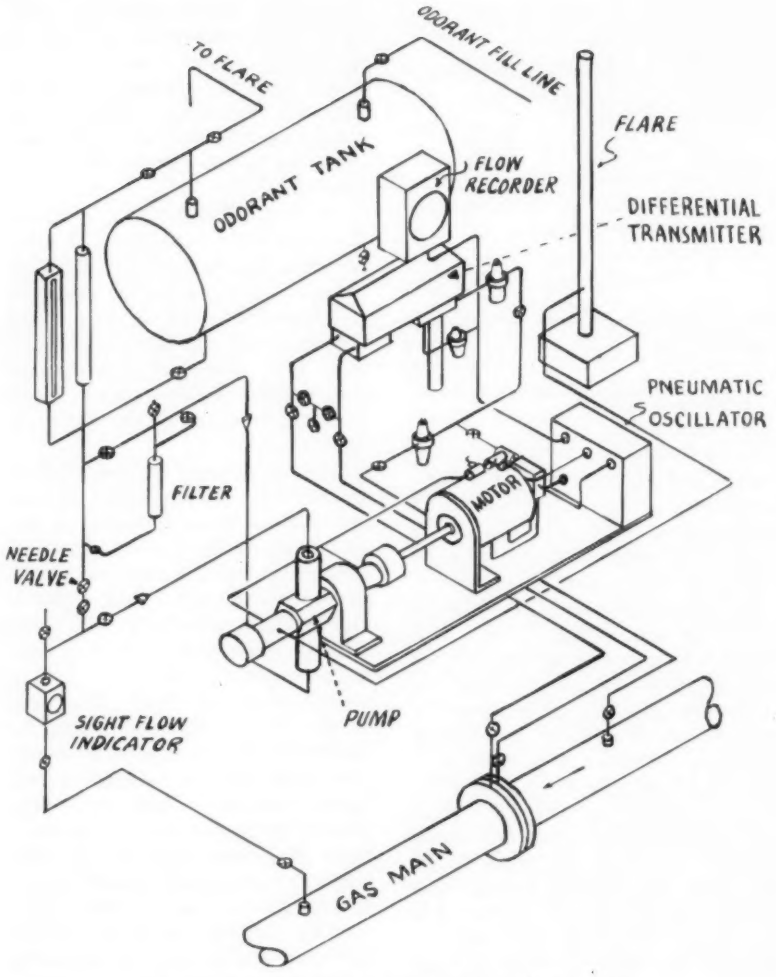


Fig. 9. Piping diagram of pneumatic motor odorant pump.

cycles/minute. As can be noted in *Fig. 5* the bellows of the load pilot valve is connected between the restricting needle valve and

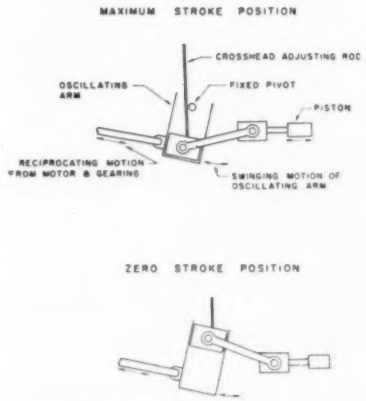


Fig. 10. Diaphragm pump stroke adjustment mechanism.

the pilot valve of the oscillator circuit. The pressure in this bellows varies from 0 to the power gas pressure at the same frequency as established by the oscillator circuit. This square wave of pressure variation in the load relay bellows operates the load relay pilot valve in the same manner as the oscillator pilot valve operates and oscillates the variable output signal from the flow transmitter to the motor positioner from 0 psig to the signal value.

Fig. 6 shows the pneumatic signal sent from the load pilot valve to the motor positioner. When the load pilot relay bellows is expanded the vent in the load pilot valve is open and no pressure reaches the motor positioner. When there is no pressure in the

load pilot relay bellows the vent is closed and supply port is open so that the signal from the flow transmitter reaches the motor positioner. The frequency of stroking is changed by manually adjusting the orifice in the pneumatic oscillator. In practice the frequency is adjusted to establish the basic desired odorant rate. From that time on, load changes are compensated for automatically by the flow transmitter changing the length of the stroke.

A detail of the driving motor is shown in *Fig. 7*. When any pressure less than 3 psig is admitted to the bellows the pilot valve closes the power gas inlet and the piston is driven to the left by the power gas that is continuously applied on the smaller area of the piston. When a pressure greater than 3 psig is applied to the bellows, the pilot valve closes the exhaust port and opens the power gas inlet port. Power gas on the left of the piston causes it to stroke to the right. As the piston strokes, the spring connected to it compresses the bellows and causes the pilot valve to assume a throttling position which stops the stroking of the piston. The greater the pressure in the bellows the farther the piston must travel in order for the piston spring to overcome the pressure and cause the pilot valve to assume a throttling position.

As with any new piece of equipment, this pump was not without its defects. The original pumping end tended to vapor lock so a new design of piston was installed even before the tests were run as shown in *Figs. 3* and *4*. The original piston and modified piston are shown in *Fig. 8*. The modified piston made use of a step design and solved the vapor lock problem very satisfactorily. Sweep gas was passed through lantern glands in the packing to keep any odorant that passed the packing from escaping into the atmosphere. The sweep gas was discharged into a low pressure water-sealed holder. No major difficulties were experienced with either the pneumatic oscillator or pump motor.

On the strength of the satisfactory tests of the original unit, a second unit was installed at an unattended station in the fall of 1955. This unit presented operating difficulties from the outset. As originally piped, the sweep gas discharge from the pump packing lantern glands went to the pressure-tight case containing the pneumatic oscillator and then from this case to a constant burning flare. The slight back pressure created by the flare caused the pneumatic oscillator to speed up when the pressure case was closed. This made accurate adjustment of the pneumatic oscillator practically impossible. The piping was revised so that the sweep gas from the pump lantern glands went directly to the flare while the pneumatic oscillator utilized unodorized gas that was discharged directly to the atmosphere.

Fig. 9 shows the entire odorizer piping after the revision was made. The piping system is relatively complex, but is almost all of small diameter and can be housed in a small area. The sight flow indicator has been incorporated in the piping of all our

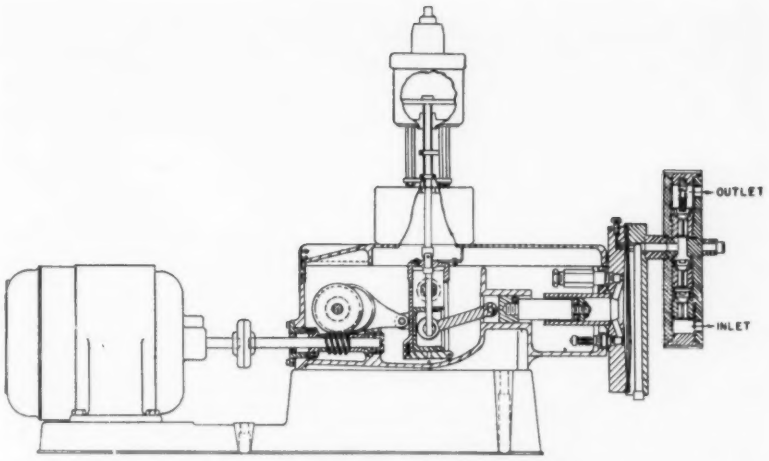


Fig. 11. Cross section of diaphragm pump.

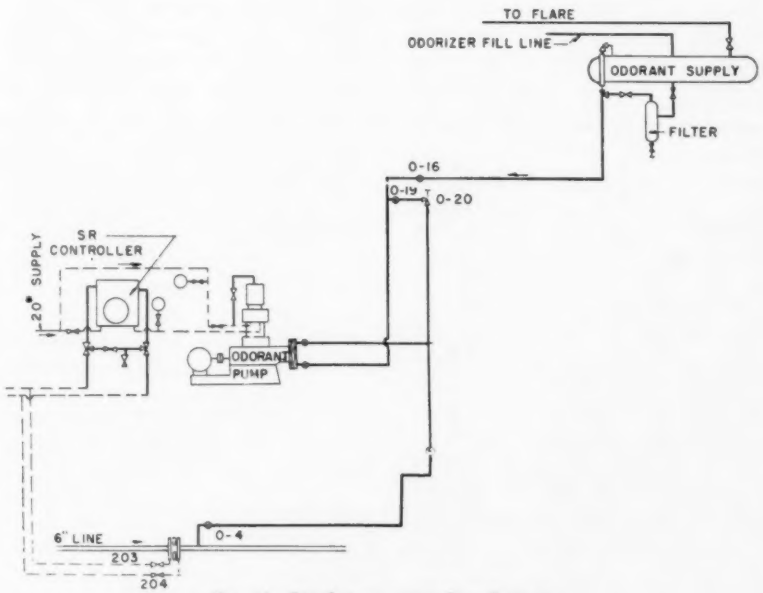
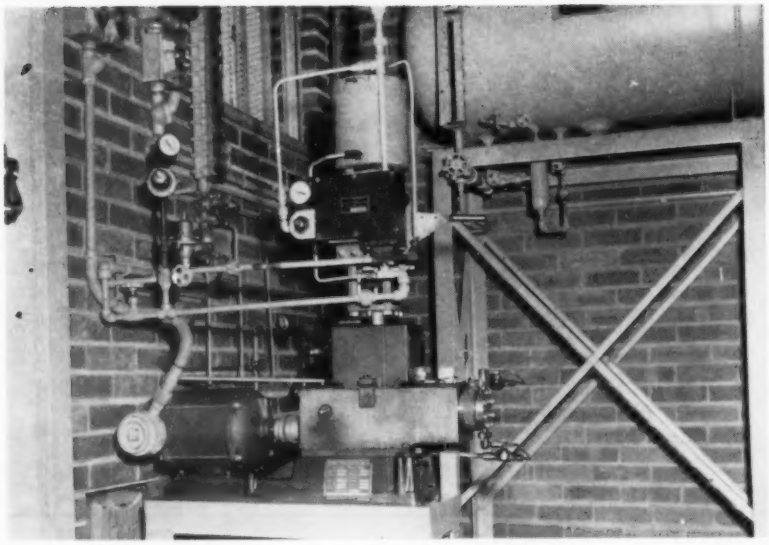


Fig. 12. Diaphragm pump fine diagram.



Northern Illinois installation showing a Lapp Pulsafeeder with auto-pneumatic control being used on odorant service.

pump-type odorizers and gives the maintenance man an immediate indication as to whether or not the pump is operating correctly.

After several months of operation, it became apparent that the amount of sweep gas passed through the lantern glands in the packing is not sufficient to evaporate the entire quantity of odorant on the shaft and that the shaft would still be wet with odorant as it came out of the packing. This small amount of odorant exposed to the atmosphere has a high nuisance value. At the present time, both the pump manufacturer and the Northern Illinois Gas Co. are working on this problem. One solution being tested is to enclose the pump shaft in a pressure cylinder at both ends of the pump and to use sweep gas through these cylinders instead of through lantern glands in the packing. Another solution being tried is to retain the sweep gas through the packing lantern glands and to place the entire pump portion in a pressure-tight case with the case vented to atmosphere through a charcoal filter.

The Northern Illinois Gas Co. also has installed a combination piston diaphragm pump as have many other gas companies. This pump has the advantages of a piston pump with its stroke easily adjustable. The piston does not pump odorant, however, but oil, which in turn hydraulically moves a diaphragm back and forth. The displacement of the diaphragm pumps the odorant through suitable intake and discharge check valves. This arrangement has the great advantage of eliminating stuffing boxes, which are a constant trouble threat when the piston itself is used to pump the odorant.

The unit is driven by a small electric motor which, through suitable gearing, moves the piston at 58 strokes/minute. The length of stroke is adjusted by positioning a crosshead linkage in an oscillating arm which travels in a fixed arc. This mechanism is schematically illustrated in *Fig. 10.*

When the crosshead linkage is at the bottom of the oscillating arm, the full reciprocating motion is transferred to the pumping piston. By raising the crosshead linkage in the oscillating arm, less and less motion is transmitted to the piston until the center of the crosshead linkage is level with the fixed pivot at which time no motion is transmitted to the piston.

The crosshead adjusting rod can be positioned manually or, in the case of the auto-pneumatic model, it is positioned by a pneumatic motor and positioner. In this case, the gas flow is measured across an orifice and the flow transmitted into a variable 3-psi to 15-psi signal by a pneumatic flow transmitter. With a 3-psi signal into the pneumatic motor positioner, the stroke adjustment mechanism is in the zero stroke position. With a 15-psi signal the mechanism is in the maximum stroke position. *Fig. 11* shows a cross-section of the pumping unit while *Fig. 12* shows a piping layout of the entire odorizer assembly.

In practice, we have had trouble with minute air bubbles forming in the hydraulic oil. These, of course, reduce the pumping rate and in the case of low flows, where the piston stroke is small, often cause the unit to stop pumping odorant altogether. This effect is graphically illustrated by

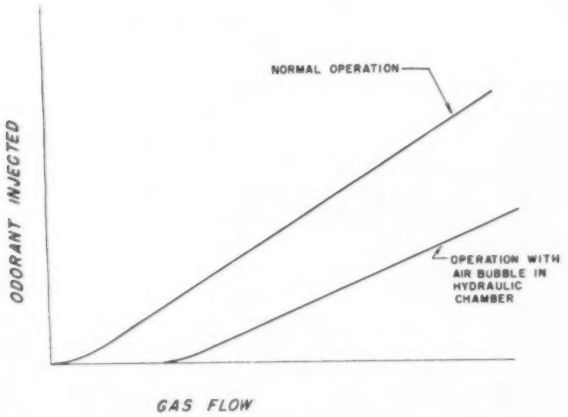


Fig. 13. Effect of air in hydraulic chamber of auto-pneumatic diaphragm pump.

Fig. 13. It is felt that the cause of this air in the hydraulic oil is due to too frequent operation of the pressure relief valve and compensator valve. These valves are built-in features of the pump. The relief valve prevents dangerous pressures from building up in the pump by relieving excess pressure within the compression chamber. The compensator valve opens as the compression chamber demands oil and maintains a constant volume. Too frequent operation of these valves brings a fresh supply of oil into the compression chamber and air intrained in the oil forms an objectionable bubble. The solution to the problem appears to be the proper adjustment of these valves, which we have done with considerable improvement. They should be set to operate only when necessary to safeguard the equipment.

The diaphragm pump just described has the large advantage of requiring no stuffing box; however, we consider the fact that electricity is required for the prime mover as a disadvantage. The Northern Illinois Gas Co. has assembled and is now in the process of testing a diaphragm pump powered by the pneumatic motor described previously. All component parts are available from manufacturers. If this unit proves successful, it will meet the three requirements that we feel an odorant pump should have:

1. No stuffing box.
2. Automatically follow change in gas load.
3. Requires no electricity for either power or control.

Six years of operating experience with pump-type odorizers has taught Northern Illinois Gas Co. personnel as much about the associated piping and operating as about the pumps themselves.

Some of these items are:

1. The discharge line from the odorant pump to the gas main should be as short as practical with the piping vertical or sloping downward if horizontal runs are necessary.

2. Pressure on the odorant storage tank is generally necessary to keep the odorant from vapor locking the pumps but this pressure should be less than the discharge pressure to keep the odorant from syphoning through the pump.

3. Odorant storage tanks should be located higher than the pump.

4. Power and control gas should be unodorized even if it is to be burned in a flare.

5. Odorant piping should be as simple as practical; it should be welded and tested for leaks. The Northern Illinois Gas Co. uses a halogen detector for this testing.

6. Consideration should be given to placing the odorizing unit in a separate building or room from which air is being constantly exhausted through charcoal filters.

7. The odorant should be filtered before entering the pump to keep dirt particles from interfering with check valve operation. We have found porous stainless steel filters to be satisfactory.

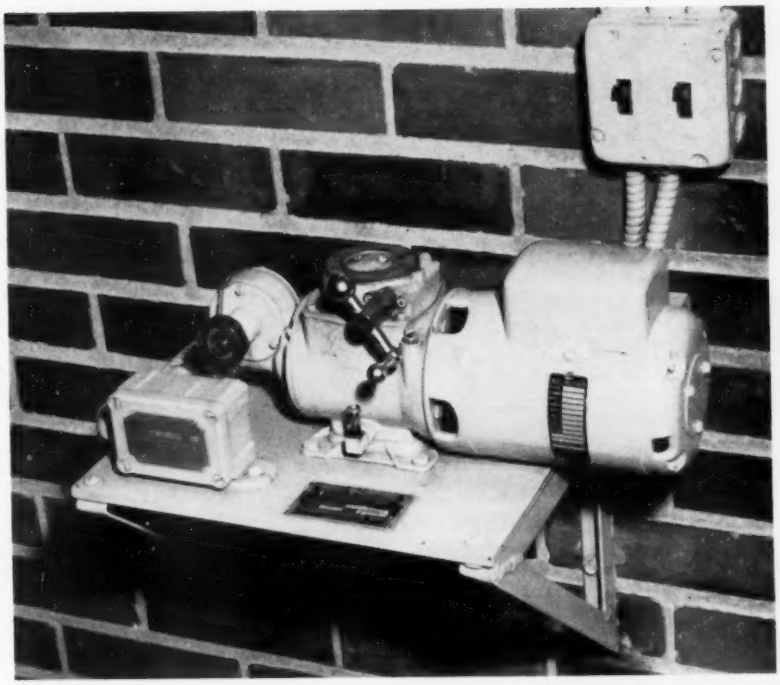
8. Proper operation of the check valves is essential. Double ball check on both the inlet and discharge appear to give the best results.

9. All valves used in the odorizer piping downstream of the pump should be of the diaphragm type and welded into the line.

10. Flanges to facilitate piping assembly should be of the tongue-and-groove type with teflon gaskets. We find that 2-bolt oval ammonia flanges work well.

11. All work on odorizers should be done by trained personnel following carefully prepared operating instructions.

The operating experience of the Northern Illinois Gas Co. with pump-type odorizers has not all been good. The odorizers have disadvantages in that gas-powered pumps require a constant burning flare, the piping is more complex than with other types of odorizers and they require more maintenance. Our experience has indicated to us, however, that our initial operating difficulties can be overcome and that they do such a superior job of proportioning odorant flow to gas flow that their disadvantages are more than outweighed. Our confidence in their performance is indicated in a recent tentative specification of the Northern Illinois Gas Co. calling for the consideration of pump-type odorizers at all new major odorizing locations. ■



This instrument controls the pumping frequency of odorant pump.

This article was adapted from a paper presented by the author at the AGA Production Conference May 20-22, 1957, at Miami Beach.

Marketing in the natural gas industry

By DENNIS L. NEWBERRY
Texas Gas Transmission Corp.,
Owensboro, Ky.

FOR nearly a decade now, the natural gas industry has been in the enviable position of having a greater demand for its product than it can supply. Immediately after World War II, a tremendous surge of growth in housing, in industry, and in our economy in general created an unheard-of demand for natural gas. This great demand caused an immediate reaction. Existing suppliers began to expand, and many new companies entered the fields of distribution and transmission to meet this demand. New housing additions, new apartment buildings, even whole new towns developed and demanded natural gas. No longer was coal the king of the househeating fuels, nor oil the crown prince. In fact, in a great many areas, coal became obsolete as a fuel for heating new homes. Natural gas became the preferred fuel from all points of view—cleanliness, convenience, and economy.

Industry, too, began to realize the value of gas, both for heat and for process needs. Gas could be controlled to exact temperature requirements, there was no handling problem. And natural gas, burning clean, eliminated a great many complaints from residential areas that were being showered with soot from plants where other fuels were being used. With the appearance on the market of adequate supplies of natural gas, many industries began to make this availability of natural gas one of the primary requisites for plant location sites. This fact explains, in part, the rapid growth of industry in the gas-rich areas of the South.

However, the coal, oil and electric industries did not take this upset of tradition lying down. When these industries, always keenly competitive, began to lose a part of their existing market and an even greater part of their future market to natural gas, they began to fight back, and to fight back strongly.

In certain parts of the United States, subsidized electric power is fighting for, and in some cases, winning both the entire industrial and domestic market. In other areas, due either to some natural advantage or to a comprehensive sales approach, coal and oil are accomplishing the same thing. Today, the gas industry can no longer afford to wait for customers to come to it. Those segments of the industry who have not as yet realized this fact are suddenly finding themselves struggling to maintain their present market and almost excluded from further market growth.

The problem, then, is this: How is the natural gas industry to meet this rejuvenated competition? Do we shake our heads in despair and say that we are at market saturation? Do we hope for some major catastrophe to overtake our competitors? The answer to these questions is, of course, no. We have a good product, our prices are competitive, and the product is readily available. We have, therefore, only one course of action. We must create a demand for our product, and that demand can and must be created by successful selling.

Making people aware of the existence of a product is the first step in creating demand. But immediately there is the thought: Everyone *is* aware of the existence of natural gas. True, but does everyone know that natural gas is now available, and in quantity? Do they know that natural gas is nature's finest, cleanest and most convenient

fuel? Do present and potential customers know how much fuel of various types that their fuel dollar will buy? Do they realize that in most areas natural gas is always instantly available — ready at the flick of a switch to provide comfort and convenience for a family, or energy for industry? Our approach to selling gas must not, and in fact, cannot be based on price alone. We must sell comfort, safety, convenience, and yes, in some markets, even prestige. Our sales approach must be tailored to the situation. We must create in every household, and in every industry, the idea that gas is a necessity, not a luxury.

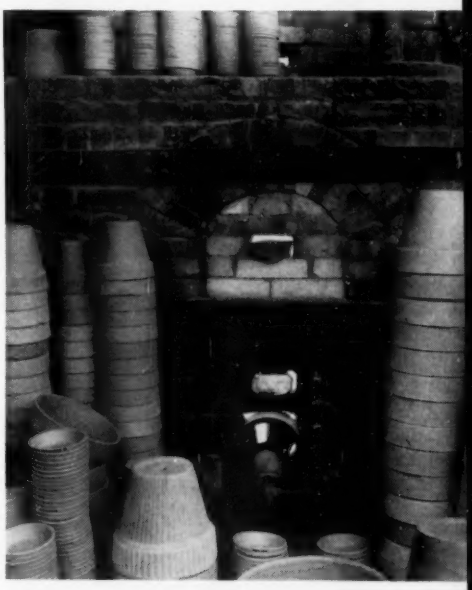
The primary objective of the natural gas industry in general, and of distribution companies in particular, should be a constant increase in sales. This can be accomplished only by securing new markets that as yet are not developed, and by replacing other fuels in existing markets. The burden of selling natural gas as a necessary commodity falls on the distribution section of the industry. This is the part of the gas industry that the consumer is familiar with, and the entire well-being of the gas industry depends on how well the distribution people accomplish this task of domestic selling.

All effective sales programs for all segments of the natural gas industry generally can be broken down into three main divisions. First, and perhaps foremost, is the development of valid statistical data. Such things as population growth, market saturation, peak day and annual consumption factors are all components of a sound statistical approach to increased sales. As a continuation, after such statistics have been developed, they must be utilized to establish a healthy growth pattern.

The second phase of an efficient sales program is customer education. Both present and potential customers must be informed of what advantages, monetary and otherwise, will accrue to them as a result of a conversion from their present fuel to natural gas. This educational approach takes many forms, too many to attempt to number or evaluate here in this short space. However, such media as direct mail, newspapers, radio, television, and many other forms of advertising can be utilized to educate the buying public to the advantages of natural gas, and thus create a desire to make use of these advantages.

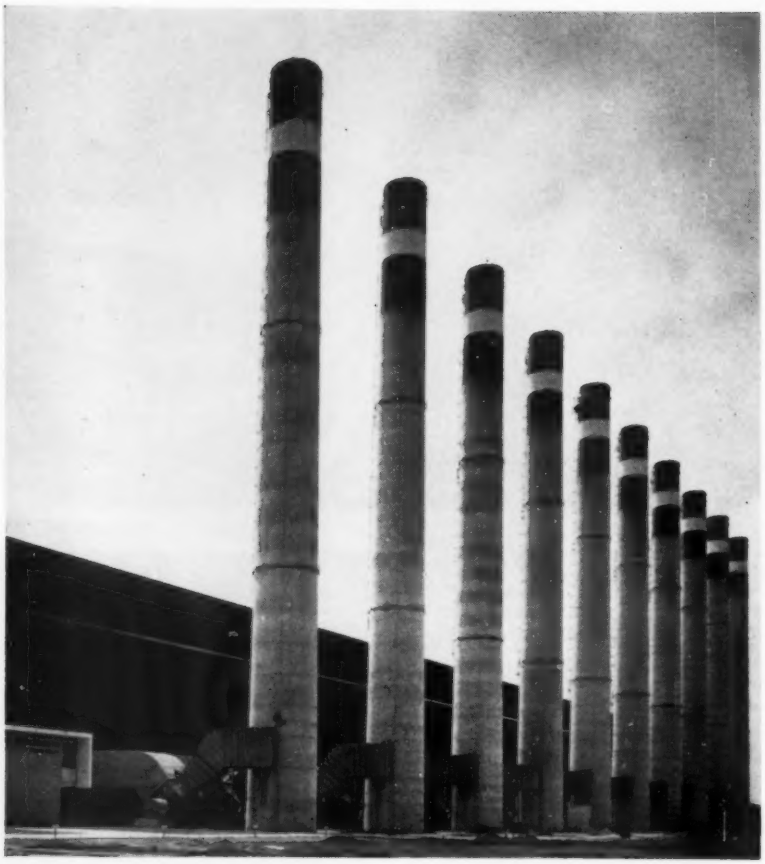
Finally, the third phase of a good program is service. The seller must constantly strive to improve both his product and his service to the buyer. If possible, a near-personal relationship should be established, based on a foundation of service. In short, a seller should be available, not only for consultation, but for commemoration and consolation as well.

"With the appearance on the market of adequate supplies of natural gas, many industries began to make this availability . . . one of the primary requisites for plant location sites. This fact explains, in part, the rapid growth of industry in the gas-rich areas of the South."



"As industry became more and more complex, there grew a greater demand for exacting heat requirements—temperatures had to be maintained at close tolerances for some processing, constant heat for long periods of time was required for others, still others required extremely clean heat."

In addition to aggressive, positive selling of the merits of natural gas, we must constantly guard against and fight the negative phases of our industry that intermittently occur. For every news article that prominently and loudly shouts of deaths caused by the malfunctioning of gas equipment, the industry loses hundreds of potential customers. Such news travels far and fast, and the millions of installations that function properly receive none of the attention of the one unit that causes disaster. The occurrence of these negative and unhappy situations can be lessened by improving our safety measures, by better personnel training, and



"Then, as in the domestic market, other fuels began to find ways in which they could compete . . ."

by constantly striving to improve our product and service. But when, in spite of all our precautions, such happenings occur, we must see to it that the complete facts are brought out, and, if possible, confine the news of such disaster. This, too, is part of a successful sales program.

Aggressive, intelligent selling, then, supplemented by comprehensive market analyses and efficient servicing, should be our approach to securing a greater and ever-increasing market.

Direct industrial sales pose a different and more complex problem. As we mentioned before, many industries require natural gas as a raw material by the very nature of their operations, and such industries present no sales problem. The rest of the industrial market, however, must be sold.

For the most part, these industries that require only heat for their operations, have based those operations on heat provided by some fuel other than natural gas. Twenty years ago, practically every plant in America that used heat in its operations produced that heat by coal. Coal was a cheap, plentiful and proven fuel. Not until after World War II did coal begin to feel the competition of other fuels. Faced with steadily increasing coal costs and intermittent plant shutdowns caused by lack of fuel, industry began to seek other fuels.

At about this time, due to the tremendous expansion that was necessitated by an ever-increasing domestic market, the gas industry found itself with considerable excess capacity during the greater part of the year. Pipelines that were designed for winter peak operation lay idle during the warm months. With constant operating costs and certain purchase contract minimums to meet, nearly all segments of the industry were able to offer this off-peak gas at a competitive price to industry.

This appeared to be a happily timed situation. Industry wanted a new fuel, and natural gas had suddenly become generally available. However, there was one major drawback. Industry wanted this fuel at all times, but, during the winter months pipeline capacity was committed, and industrial sales had to wait until the needs of the domestic market were taken care of. This drawback was resolved most generally by the installation of dual fuel systems whereby gas could be utilized eight to ten months out of the year, and some other fuel could be used during the extreme cold period when gas would not be available.

As industry became more and more complex, there grew a greater demand for exacting heat requirements — temperatures had to be maintained at close tolerances for some processing, constant heat for long periods of time was required for others, still others required extremely clean heat. For all of these purposes, natural gas was the most efficient fuel, and generally the most economical. Then, as in the domestic market, other fuels began to find ways by which they could compete, and today, as in the domestic market, natural gas must be sold to every industrial customer solely on the basis of what advantages, monetary and otherwise, it will provide over a competing fuel.

To summarize, the natural gas industry once again faces a buyer's market. The consumer, both domestic and industrial, is shopping—bargain hunting, if you will. There are no longer backlogs of customers waiting for service. We are engaged in a highly competitive contest for new customers.

We have many problems. Operating costs are rising, regulations are becoming more rigid, securing reserves for expansion is becoming increasingly difficut. However, there is a solution to each of these problems, and each solution stems from one source—increased sales. And in today's market, there is only one way to build gas sales—*You have to sell it!* ■

The Verified Long Life seal can be seen on full-size billboard outside dining room where 400 plumbing contractors and journeymen plumbers heard the upgrading program outlined.

Upgrading of water heaters advancing in California

SUCCESS of a two-year old upgrading program of automatic gas water heater sales in the Los Angeles area resulted in extension of the program into San Diego county recently.

More than 400 plumbing contractors and journeymen plumbers heard the program outlined by William J. Bailey, F. L. Line, and S. C. Gorman, of the Verified Long Life Water Heater Association, and by Murray Holloway and promotion staff of the San Diego Gas & Electric Co., co-sponsor of a recent dinner meeting.

In reviewing the background and success of the Verified Long Life Water Heater Association, Bailey paid tribute to the Southern California Gas Co., Southern Counties Gas Co., and San Diego Gas & Electric for their support and promotion of the Verified Long Life program, which has gained unprecedented acceptance by plumbing contractors.

Each manufacturer-member of the Verified Long Life Association must abide by rigid specifications established by the association in order to be eligible to place the Verified Long Life seal on non-ferrous, 10-year warranty water heaters, it was explained. The seal thus serves as a buying guide and a consumer protection.

Positive quality control of Verified Long Life gas water heaters is maintained through periodic field inspections made by an independent testing laboratory. The testing laboratory buys gas water heaters bearing the Verified Long Life seal periodically on the open market, then submits the heaters to thorough tests to insure that such heaters meet all established specifications. This control guarantees that Verified Long Life gas water heaters continue to comply with all specifications and requirements established by the manufactuerer's association.

Current promotion of the Verified Long Life program by southern California gas utilities includes more than 500 billboards featuring Verified Long Life gas water heaters, streetcar, bus and truck cards carrying the same message, and radio, television and newspaper advertising which further promotes the program on a year-round basis.

Manufacturers participating in the Verified Long Life program to promote high quality standards throughout the water heater industry, as well as to promote better public appreciation and acceptance include: Continental Water Heater Co., Day & Night Manufacturing Co., Holly-General Corp., Mission Appliance Corp., Rheem Manufacturing Co., and Utility Appliance Corp. ■

Miss Gay Cowie, as "Miss Verified Long Life," added glamour to dinner meeting where William J. Bailey (left) and F. L. Line of association were principal speakers.

Let's take a close look at . . .

Legal basics of gas distribution

By SCOTT HUGHES, First Vice President
Southern Union Gas Co., Dallas

SUCCESSFUL gas distribution operations can no more be carried on without a firm legal foundation than can a skyscraper be erected without a firm material foundation. The necessary legal foundation has been supplied by lawyers and counsel through the years and their advice and assistance in the future will be essential to its maintenance.

But right here a question arises. In the day-to-day operation of gas distribution systems, which is legally more important; fine print? Or fine understanding?

Before attempting an answer to the question, consider this, because it fits most distribution companies. A company may have a sound charter and corporate organization; the regulatory scheme under which it operates may be reasonable and effective; its local franchises and certificates of service may be concise and not unfavorable; and its operating practices, policies, rules and regulations may be all carefully reduced to writing and excellently integrated. But again, that question: Is the totality of that legal structure understood?

Can you, can your key supervisors—can the rank and file of your people—clearly articulate and consistently apply the legal rights and obligations that thus compose the basis of your daily operations? It is hoped that many may give strong and affirmative answers to such questions. Probably there are some who would have to hesitate.

Strangely enough, it is my conviction that improved legal understanding—in any given gas distribution operation—is primarily a challenge to and the responsibility of those operating and staff personnel who do not work in the so-called legal department.

In the conviction just expressed, it is not suggested that non-legal personnel need to become legal experts. On the contrary, I have in mind their establishing a relationship with company lawyers that is similar to the relationship with a family doctor. In times of sickness and the adversities of health, one goes to a doctor and he accepts full responsibility for the course of treatment. However, the problems of maintaining personal health and vigor in ordinary, every day living are one's own responsibility, although under the general advice and guidance of the medical expert. Under these circumstances, the patient must follow rules of health, but isn't that simply saying that rules of health must be understood?

Perhaps the chief need for improved legal understanding of the gas distribution business lies in its most important segment: that is in the consumers and the public it serves.

A significant evaluation of what a public utility company actually is cannot be found in its legal and financial documents, neither can it be found completely in the character and efforts of the people who operate its services. The evaluation of that company—which really counts—is the one regularly formed and crystalized in the individual and composite minds of its public. To say the same thing another way, there are compelling reasons why the public should understand—as best it can—what makes a gas distribution operation tick the way it does.

In a planned program for public understanding and support, a high quality of service is not a complete answer. The fact that we deliver our product and render our service with faithful, adequate and unbroken regularity will not, by itself, accomplish the goal. Witness the recent hassel over post office service, where I do not recall a single significant article, among the welter of bureaucratic and political publicity, which emphasized the fine performance record through the years of the Post Office Department. Regularity becomes routine and routine service is taken for granted.

Perhaps, it would be well at this stage to recognize that a tremendous portion of potential public misunderstanding about our business is, indirectly,

legal in origin. There are peculiar legal differences implicit in a public utility business which distinguish its status from the vast bulk of other private enterprises. What are these legal crosses we bear?

First, we are a regulated business; though (and we should all be thankful) we are still members of the American free enterprise system. Why are we regulated is both a legal and practical story, but one which the public generally does not understand. Too often our public accepts the fact of regulation but nevertheless doubts the effectiveness of the process. Under these circumstances a gas company may find itself, as reflected in the public mind, with the relative standing of a person who has repeatedly been indicted by the Grand Jury but always beats the rap at his trial.

Another legal source of public misunderstanding is the franchise, or similar certificates of service authority, customarily granted for a long term of years. Here again, the public may accept the fact of the franchise but inwardly resent two features. First, the long term of years, which implies an abdication of the power of the people. Doesn't other business have to re-earn and re-establish its position every year? Second, the public may also feel that if the franchise is necessary to the public utility company, it must be very valuable and therefore should have commanded a good price from the utility when it was granted.

This brings us right up against that horrible legal word "monopoly"; a concept which is most deeply anti-American in its implications. Freedom to choose is basic. Two years ago it was Chevrolet; last year Ford; this year, its Plymouth. And by cracky that is the way this nation wants it. While we, inside the business, know that the gas distribution business today has keen and growing competition for all of its services, we cannot escape the public fact that in the vast majority of areas there will be only one gas company. We must counter this with accelerated salesmanship to convince the public of the propriety and economy of the franchise system. In addition we must firmly convey the ideas that our business too, is dedicated to customer satisfaction, and that progress in gas service is a vital and continuing force.

As another aspect of our legal status and inheritance, may I mention "bigness." Inescapably, in any community, a gas distribution system is relatively big business. Regardless of the size of the pond, we are one of the big frogs. This means there must be a sensible effort to keep our operations humanized and to offset the poisonous concepts of being rich, powerful or high-handed, all of which the public so easily associates with bigness.

As a final illustrative item of legal derivation but potential public confusion, consider discrimination. We, in the public utility business have been working our anti-discrimination stuff long before the present Supreme Court members put on long pants. The idea is fine. We do not discriminate in service or charges between any customers within a class and all differences between classes are proper and reasonable. As a result of this business philosophy, however, there are many little things—usual and common in every day life—which we cannot and should not do. We can't do business on a friendship basis, nor can we freely adjust our practices to specific cases of local importance. Nor are we at liberty to negotiate in many instances. Think how easily the public can interpret the application of our anti-discrimination rules as being a "take it or leave it" philosophy.

So far, these have been highly generalized problems. Here are suggestions as to what non-legal, operating personnel can do toward ameliorating the legal misconceptions of the public.

First, sit down and carefully analyze, in your own operations, each step, each transaction, each contact with a consumer from the pre-initiation of your service to him until the termination of that service. Find out what is actually done, who does it, when and how.

Second, sit down again but this time with your lawyer and re-evaluate at least these questions: (By then, you will probably have many more.)

Are we doing it legally?

Is what we are doing necessary and why are we doing it?

Do our own personnel fully understand it?

Can we legally do it in a way which might be better from a human relations viewpoint?

Are we unconsciously or deliberately relying on big legal concepts, or even on fine print, instead of trying in each such public contact to create a basis for better understanding?

In conclusion, let's examine an analogy. We all know that modern, gas distribution operations are tremendously complex, involving a vast series of legal and other relationships among people.

So does modern traffic on the highway.

For our traffic operations, even like our gas operations, we have laws and rules; we have a great number of signs and directions; and we have a system of police and courts to back up and control the procedures. None of these could be abandoned without chaos.

But what is it that really keeps traffic moving on the highways? Isn't it the individual understanding and acceptance of those laws and rules plus the personal exercise of judgment and restraint and courtesy in honoring them? Isn't it really the broad acceptance by the public of those fundamental and correlative rights and obligations which each driver owes to and is due from the others?

When we can establish that level of public understanding and appreciation of the gas distribution business—and mind you, I think we will have to go more than half the way to find it—then our legal heritage will truly remain our solid foundation, without becoming our daily concern. ■

This article has been adapted from a paper presented by Mr. Hughes at the Southern Gas Association convention April 29-30-May 1 at New Orleans, La.

GAS news

Court protects AGA Seal of Approval

A U. S. district court has penalized a California manufacturer of water heaters for unauthorized use of the American Gas Association's Seal of Approval.

The AGA calls it a "clear-cut precedent which will mean continued protection for the gas industry's coveted 'Blue Star' approval seal granted to appliances which meet rigid standards of performance."

Judson J. Whitehead Jr., Oakland, Calif., was fined $5000 and two firms he has headed—the Jud Whitehead Heater Co. and the Hynes & Cox Electric Corp.—were fined $2500 each by Federal Judge Oliver J. Carter in the U. S. district court in San Francisco for violating a permanent injunction issued in 1953. Judge Carter warned that further violations will result in imprisonment.

Action was instituted against Whitehead in 1953 on grounds that he had used the AGA seal on gas appliances which had not been approved. This resulted in a permanent injunction being issued against him in December 1953. AGA subsequently contended the injunction was not being observed and that Whitehead and his companies should be cited for contempt of court. Approximately three years of litigation ensued, culminating in the $10,000 fines imposed by Judge Carter.

Citing the "evasive misleading nature" of Whitehead's testimony in the proceedings, Judge Carter also turned down the defendants application for future use of the AGA Seal of Approval.

Lone Star pours cold water on merger talk

Bethlehem Supply Co. has been named a distributor of oil field casing and tubing manufactured by Lone Star Steel Co., Dallas. And, according to Lone Star's president, E. B. Germany, the deal is a straight sales arrangement and covers only oil country goods.

Inasmuch as there have been rumors that Lone Star might merge with other interests, Mr. Germany was asked during a press conference if the naming of Bethlehem Supply as a distributor might have implications that his company was looking toward closer affiliation, even merger, with Bethlehem Steel, parent of the distributor.

"None whatsoever," Mr. Germany answered. "Bethlehem Supply simply wants a portion of our pipe production to augment its existing supply . . . There is no more of a possibility of hidden motives in this arrangement than there would be in the case of any other manufacturer furnishing products to Bethlehem."

Consumers' establishing industrial growth section

Consumers' Gas Co., Ltd., Toronto, has retained the services of a plant-location consultant firm to help Consumers industrial development throughout its service area.

Fantus Factory Locating Service will assist Consumers' in the establishment of an industrial development department. The program will include community analysis and assistance to communities in order to insure their readiness for industrial development.

Consumers Power plans $70 million expansion

Consumers Power Co., Jackson, has asked the Michigan PSC for an okay to sell securities worth $70,157,000. The funds would be used for expansion of the company's facilities.

Robert P. Briggs, executive vice president of the company, said the utility would use the money "to finance the continuing expansion and improvement of the company's electric and gas service facilities in a 64-county outstate Michigan area."

Municipal utilities continue to grow

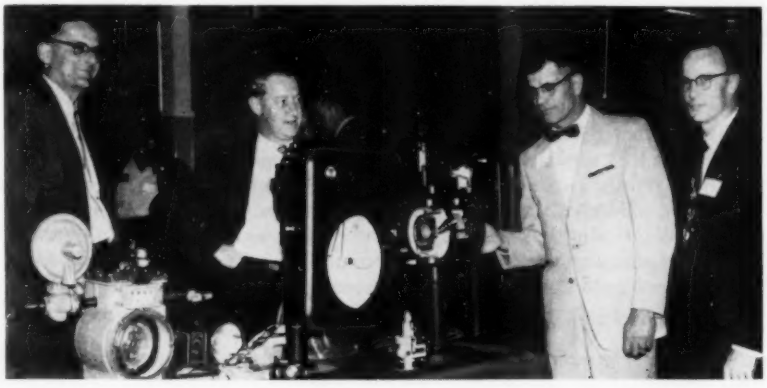
Municipally owned gas distribution systems continue to grow, figures collected by the U. S. Commerce Department show.

Income from public gas systems in 1956 hit $90 million, including both revenues and borrowings. This was an increase of $22 million or 32.4 per cent over 1955, and compares with $49 million in 1952.

Expenditures by the utilities in 1956 also totaled $90 million, the first time in three years the city gas systems as a whole had been able to break even. Expenditures include funds for current operation, new construction and other capital outlays, and interest on debts.

In 1955, municipal gas utility spending amounted to $88 million, $20 million more than revenues. In 1954, expenses were $61 million, $1 million more than revenues.

The figures show that the last year in which these utilities as a whole recorded a "profit" was in 1953, when revenues were $60 million and expenses $48 million. In 1952, revenues were $49 million and expenses were $42 million. For



Orifice meters and regulators were featured in an exhibit at the Panhandle section of ISA's second biennial instrument show recently in Borger, Texas. Discussing the American Dri-Flo meter are (from left): Andrew J. Sesock and S. Calvin Walker, sales engineers for Westcott & Gries Inc.; and H. G. Hager, instrument foreman, and A. C. Farmer Jr., chemist, Phillips Chemical Co.

the years 1952-1956, total revenues and expenses equal out at $329 million each.

Industries to burn gas on smoggy days

Los Angeles industries will burn natural gas instead of fuel oil on smoggy days to reduce air pollution, City Attorney Roger Arnebergh announces.

Air Pollution Control District engineers estimated this move will eliminate 500 tons of pollutants from the atmosphere daily. "While there is not enough natural gas available to burn it exclusively all the time, the use of it by industries during periods of temperature inversion would eliminate one of the major sources of smog," the city attorney said. Details of the plan were developed at a meeting called by Arnebergh.

Engineers of the gas companies at the meeting said gas brought in by pipelines will be pumped into depleted oilfields and stored until ready for use. "Our underground storage facilities were acquired for, and have been developed to provide the additional gas required by our customers . . . during winter peak periods and emergencies," said a joint statement of Southern California Gas, Southern Counties Gas, and Pacific Lighting Gas Supply companies.

"This program will require the installation of additional injection equipment in existing reservoirs so as to be able to more rapidly refill those reservoirs over what will be a shorter period . . .

"Our engineering studies will start immediately and we will continue to press forward with the installation of additional injection capacity."

Smog Control Officer Smith Griswold hailed the move as an important step. He pointed out that electric generating and other industrial plants using fuel oil to generate steam add hundreds of tons of pollutants to the air daily. It is estimated that fuel oil produces 650 tons of air pollutants daily during a peak load day, while natural gas would only produce 160 tons.

IGT publishes study of coal gasification

Even though large reserves of natural gas are assured, long-range planning by the gas industry must consider alternate sources of high-Btu gas.

Natural gas substitutes, primar-

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. . TURN THE SWITCH
% L.E.L.
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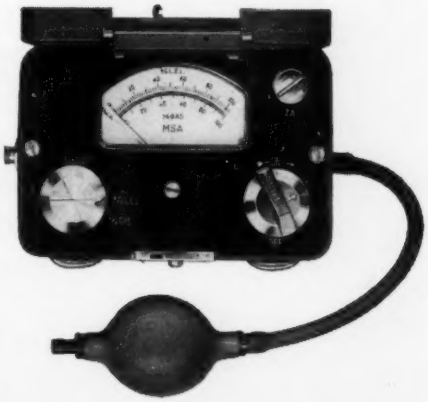

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ily for peak load purposes, have been produced by gasification of oil and other liquid hydrocarbons. However, they must ultimately be derived from coal, the most plentiful and widely distributed of the fossil fuels.

None of the present gasification processes can convert the entire coal substance into 800-900 Btu gas. The conversion of coal to natural gas substitutes therefore involves at least two process steps: One for coal gasification to produce a synthesis gas consisting essentially of carbon monoxide and hydrogen, the other for upgrading the gas by methanation.

The Institute of Gas Technology has completed development of the first step, with a process which is not dependent on the quality or ash content of the coal. This permits utilization of low-grade, low-cost coals.

In the IGT process, which has been tested on a pilot plant scale and is now being used in production of synthesis gas for methanation studies, coarse coal granules are introduced into a carrier stream of compressed air and steam to form a suspension, the pores of the granules becoming infiltrated by the gas. The coal-air-steam suspension is directed through a nozzle, resulting in a rate of pressure drop sufficient to cause a portion of the gas-impregnated granules to be ruptured by internal pressure. The nozzle discharges into a cyclonizer, where the suspension of shattered coal and gas flows in a rapid vortical motion and the particles are further ground by attrition.

The coal-air-steam suspension and additional superheated steam are introduced separately into a high-temperature vortex chamber or second cyclonizer, in which attendant heating, softening, partial devolatilization and partial combustion further reduce the coal particles, 65 to 80 per cent of which could now pass through a 200-mesh sieve. Compressed oxygen is added, and the stream is passed into a reaction chamber, where the carbonaceous material is gasified in suspension at a pressure above atmospheric. The ash flows as molten slag into a catchpot.

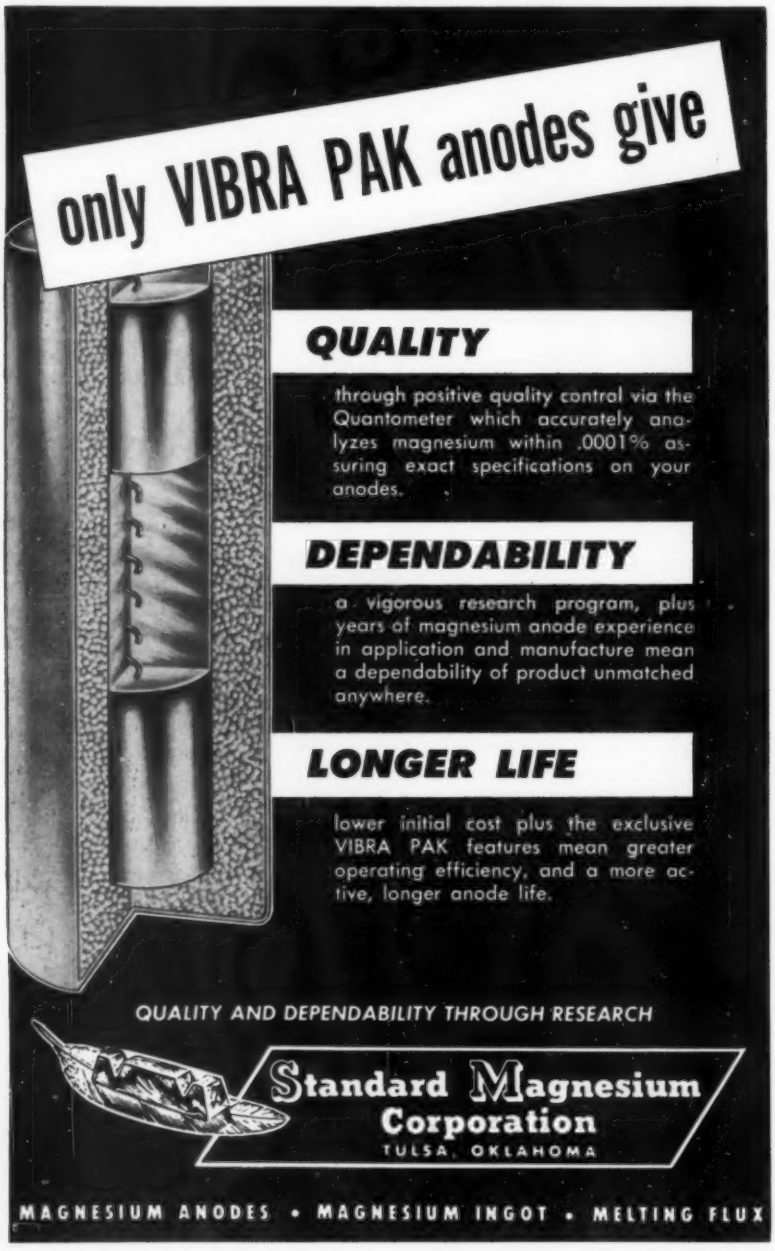
In pilot plant tests at pressures of 5 to 7.5 atmospheres, 90 to 95 per cent of the carbon in both coking and non-coking coals was gasified. The product gases ranged from 70 to 80 per cent hydrogen plus carbon monoxide, with an H_2/CO ratio generally greater than 1.0. Water-gas shift of a portion of this synthesis gas increases its H_2/CO ratio to the 2.0-3.0 range, which is the most desirable for methanation.

Results of the study, which was sponsored by the AGA, have been published in IGT Research Bulletin 7, "Gasification of Pulverized Coal in Suspension," by C. G. von Fredersdorff, E. J. Pyrcioch, and E. S. Pettyjohn.

Lone Star operating from new central service center

Lone Star Gas Co. is operating from its new $1.3 million central service center in South Dallas. The structure, located in a 6-acre tract, replaces adjacent facilities established in 1923 and which for many years served all Lone Star customers in Dallas.

Gas distribution and maintenance operations as well as construction of gas mains and other street department work in south and east Dallas will be routed from the new building. In these sections, Lone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through positive quality control via the Quantometer which accurately analyzes magnesium within .0001% assuring exact specifications on your anodes.
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a vigorous research program, plus years of magnesium anode experience in application and manufacture mean a dependability of product unmatched anywhere.
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Star presently serves 65,000 customers, representing about one-third of the total Dallas customers.

The central service center is headquarters for all gas distribution operations in Dallas. It augments similar centers established in 1950 on Mockingbird Lane to serve customers in the north section and in 1952 at Oak Cliff for customers west of the Trinity river.

Northern Illinois plans money raising this fall

Northern Illinois Gas Co., Bellwood, plans to raise between $8 million and $10 million this fall, with Sept. 24 tentatively set as the offering date.

In making the announcement President Marvin Chandler said, "Due to present unsettled market conditions, no decision has been made as to the form of the proposed financing. However, because of the company's strong common equity position, no consideration is now being given to the sale of common stock, or securities convertible into common stock."

The new funds, Mr. Chandler explained, will be part of the estimated $40 million of new capital required for the company's projected $75 million four-year (1957-60) construction program. This outlay will provide mainly for the new customers Northern Illinois expects to connect during the four-year period. It is exclusive of any possible amounts needed for major supply or storage facilities not now planned, he said.

SoCal seeking 6.75% rate of return

Southern California Gas Co. has upped its pending rate increase by 3.5 per cent.

In its original application to the California Public Utilities Commission filed in February, the gas company requested a rate increase amounting to about 8 per cent overall. Increases in financing costs, together with a wage boost of $1.4 million in April and $2 million in gas costs not included in the original application, now make it necessary for SoCal to revise its estimates of revenue deficiencies upward, Vice President Walter J. Herrman told the commission.

Present rates applied to anticipated revenues over a 1957 "test" year indicate a gross annual revenue deficiency of $19.5 million, he said. To fully meet this deficiency,

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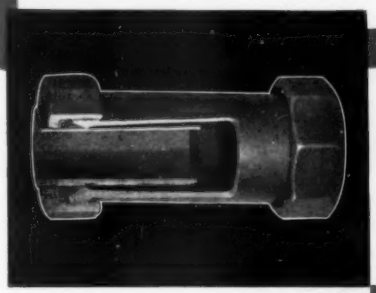

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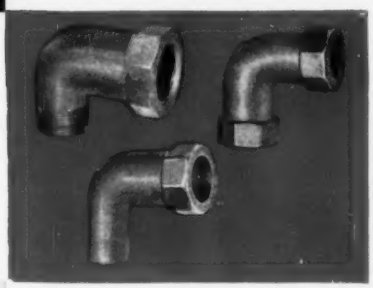

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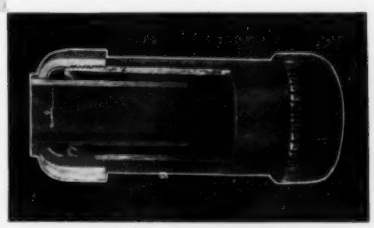

NORMAC #50-A STEEL COUPLINGS
Manufactured from extra heavy wall pipe. Couplings are available with either seamless or welded centers in sizes from ¾" to 1½" inclusive. 10" and special length centers available.

Normac also manufactures a complete line of red brass fittings in O.D. sizes: ⅝", ⅞", 1⅛", 1⅜"—and a complete line of insulated couplings and fittings.

NORTON-McMURRAY MFG. CO.
919 North Michigan Avenue — Chicago 11, Illinois

the company needs an additional $5 million over and above the amount originally requested.

The charges proposed under the revised application would mean a monthly increase ranging from 66 cents to 71 cents in the average bills of the company's 1.6 million general service customers, boosting rates about 11.5 per cent for this class of customer.

The company is asking that the commission allow a 6.75 per cent rate of return on its invested capital, Mr. Herrman said.

"Since presentation of the original application, in which we requested a minimum 6.5 percent rate of return, there has been a continuation of two basic trends: (1) The bond market has undergone further deterioration. A 4.5 per cent interest rate was originally assumed for new bond money. On June 26, however, $35 million of first mortgage bonds were sold at an actual cost of 5.1 per cent. (2) Price of our parent company stock has continued to be too low to favorably finance necessary property additions on an acceptable basis."

Utility rate study urged in West Virginia

A West Virginia state senator has proposed a legislative investigation of the state public service commission's rate-making powers and "the broad subject of public utilities."

In what amounted to a request for Governor Underwood to include the subject in his call to the 1958 state legislature, Sen. Carey asserted that the "seemingly never-ending number of petitions by certain public utility companies" to the PSC for higher rates "appears to me to be an appropriate subject for legislative study and action."

Shortly after the above proposal, United Fuel Gas Co. filed an application for a $4 million rate hike. The company has just gotten the go-ahead on a proposed $1 million increase.

In line with a state supreme court decision, the $1 million increase was granted by the PSC. Acting on the company request for $4 million more a year in gross revenues, the PSC gave United Fuel Gas authority to raise its rates by $1.5 million annually.

A commission spokesman explained that the latest increase, like the earlier $1 million raise, followed the line laid down by the state supreme court. The high court held that the PSC must take into account the amount United Fuel pays for gas piped into West Virginia from out of state, as well as the cost of gas produced in West Virginia.

Ebasco replies to Sen. Kefauver statement

Fred C. Gardner, president of Ebasco Services Inc., has denied any implication that Ebasco Services has any degree of control or influence over any utility in the U. S. He made the declaration following Sen. Kefauver's statement at the hearing of the Subcommittee on Antitrust and Monopoly of the Senate Judiciary Committee.

Mr. Gardner stated that neither Ebasco Services Inc., nor its parent, Electric Bond & Share Co., owns any stock in any electric utility company in the U. S. directly or indirectly and that neither company has any power to exert over any utility in the country.

"There are more than 5000 pages of sworn testimony in Washing-

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Everything you need—all from one dependable, experienced source. And because Perfex materials are held to specifications, because they're precision-engineered with close tolerances, you can be sure of lower costs, safer service. If you've corrosion problems, check Perfex for . . .
• PIPE—Tenite, Cycolac, P.V.C.
• INSIDE COUPLINGS plus cement and thinner for all three types of pipe.
• PROTECTOR SLEEVE scientifically engineered for renewal service, securing complete protection between old service and fitting at main where insertion method is used.
• ADAPTER FITTINGS (patented) enabling you to tie in metal and plastic service.
• PERF-A-SEAL #126—epoxy fiber-filled sealing compound . . . quick-curing (no heat required to cure). This Sealant gives you highest tensile, highest impact, highest burst strength and maximum corrosion-resistance.
Supplier to America's Leading Gas Distribution Companies
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ton," Mr. Gardner said, "as to the nature of our business and the services we render our clients. There is no mystery about it. Ebasco doesn't own any utility companies; doesn't control any utility companies; doesn't dictate policy to anybody."

His company, he said, performs engineering, construction and business consulting services for its clients and obtains its business on a strictly arm's-length basis in a highly competitive field. He pointed out that in 1956, 56 per cent of the work done by Ebasco for clients was done for companies which have never had any connection with Bond & Share. Ebasco has served more than 1100 clients in many fields who were never associated with Bond & Share.

Ebasco was formed as a subsidiary company pursuant to the provisions of the Public Utility Holding Company Act of 1935 with the approval of the SEC. The Act specifically provides for the rendering of services by such subsidiary service companies subject to close regulation and scrutiny by the SEC. And, Ebasco has operated continuously under such regulation and scrutiny and has never violated an order of that commission.

County board refuses to rezone for gas storage

The Cook county board of commissioners has turned down Northern Illinois Gas Co.'s petition to rezone an area from farming to industrial where the company had expected to place its underground propane storage cavern.

The company expressed disappointment that the City of Chicago's intervention—due to the nearness to the O'Hara Municipal airport—seemingly overweighed all the expert testimony in behalf of Northern Illinois.

A company spokesman said, "We naturally regret very much the county board's action in refusing to rezone the property where we had hoped to construct this cavern out of solid rock for the storage of propane.

"We considered this a most progressive step in supplying the increasing demands for gas service to the thousands of customers in our territory, particularly those waiting for gas heat, and had decided to undertake this project only after consulting the country's foremost experts who had engineered a number of similar installations. . . ."

Low and narrow for utility trenching

Look at the low profile of this small 155 Parsons Trenchliner! Working height is only 7 feet-4 inches. This lets it work under trees, over-hanging limbs where larger trenchers can't go. Width over crawlers is only 5 feet-4 inches for operating between buildings, in narrow alleys, and other restricted areas.

Close side-clearance puts trench within 21 inches of fences, poles, walls. Power-shift spoil conveyor dodges side obstructions. Belt direction is instantly reversible — places spoil bank on either side of trench. For all its compactness, you will be surprised at the capacity of this utility-size Trenchliner:

Digs 16 to 26 inches wide — 10 feet deep. It has 30 digging speeds (60 optional) from 5.8 inches up to 25 feet per minute. Low range lets the 155 "inch" its way past cross-pipes, through rock. High range gives top output on open terrain.

Sloping boom undercuts walks, curbs, gutters, makes vertical set-ins flush with main lines or foundation walls. Positive down-crowd with hydraulic control starts cut fast, holds accurate grade. In fact, this small 155 has all the heavy-duty characteristics of larger Parsons Trenchliners.

It's heavy-duty in every detail — has cast-steel buckets, "Tap-In" teeth, spring-cushioned bucket cleaner, fully enclosed gearing, tractor type crawlers with 16-inch grouser treads, 12-inch flat shoes optional, gas or diesel power. Call your Parsons distributor for complete facts. (Larger ladder or wheel-type Trenchliners are available on crawlers; also the mobile rubber-tired Trenchmobile®.)

mail to: **PARSONS Company, NEWTON, IOWA** *Send us catalog on 155 Trenchliner®*

NAME_____ TITLE_____

COMPANY_____ DIV._____

STREET_____

CITY_____ STATE_____

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TO BE MORE ACCURATE

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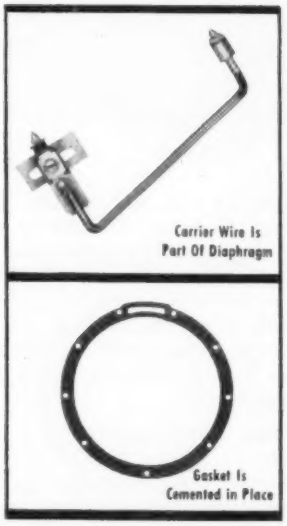
COMPLETE DIAPHRAGM WITH
BUILT-IN ADJUSTABLE CARRIER WIRE

- Assures perfect centering in meter, with featherweight floating action.
- Adjustable carrier wire is integral part of diaphragm.
- All adjustment is at center pan screw for differences in meter case thickness and distance of main movement from flange face of meter.
- Gasket is already cemented to rim—no hole aligning.



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GAS calendar

September

3- 5. Pacific Coast Gas Association Annual Convention—San Francisco.

6. New Jersey Gas Association Annual Meeting—Spring Lake, N. J.

9-10. INGAA Annual Meeting—Shamrock Hilton Hotel, Houston, Texas.

9-13. AGA Industrial Gas School—Hotel William Penn, Pittsburgh.

10. New England Gas Association Safety Conference — Sheraton-Plaza, Boston.

10-12. Mid West Gas Association Gas School and Conference—Iowa State College, Ames.

11-13. National Petroleum Association 55th Annual Meeting—Traymore Hotel, Atlantic City.

12. NEGA Residential Sales Division —Boston Gas Co., Boston.

13-14. Maryland Utilities Association 33rd Annual Fall Conference—Cavalier Hotel, Virginia Beach, Va.

16-18. AGA 9th Annual Accident Prevention Conference — St. Louis, Mo.

18-20. Southeastern Gas Association Convention—Robert E. Lee Hotel, Winston Salem, N. C.

20. Oklahoma Utilities Association Gas Division Conference—Skirvin Hotel, Oklahoma City.

20. AGA Great Lakes Public Relations Workshop—Hotel Statler, Detroit.

23-25. American Society of Mechanical Engineers—Statler Hotel, Hartford, Conn.

27. NEGA C-H-I Division—Wachusett Country Club, West Boylston, Mass.

October

1- 2. Texas Mid-Continent Oil & Gas Association 38th Annual Meeting—Texas Hotel, Fort Worth.

7- 9. AGA Annual Convention—Kiel Auditorium, St. Louis, Mo.

10-11. California Natural Gasoline Association Annual Fall Meeting—Huntington-Sheraton Hotel, Pasadena.

15-16. Fifth Gas Measurement Institute (sponsored by University of Kansas and Southwest Kansas Petroleum Institute)—American Legion Hall, Liberal, Kan.

16-18. Wisconsin Utilities Association Gas & Electric Operation and Sales Sections Convention — Schroeder Hotel, Milwaukee.

21-25. National Safety Council—Conrad Hilton Hotel, Chicago.

23. NEGA Accounting Division — Sheraton-Biltmore, Providence.

November

6. . NEGA Operating Division—Hotel Statler, Hartford, Conn.

11-14. . American Petroleum Institute—Conrad Hilton Hotel, Chicago.

13-15. . ASA 8th National Conference on Standards and 39th Annual Meeting—San Francisco.

14-16. . American Society of Refrigerating Engineers Semi-Annual Meeting—Shoreland Hotel, Chicago.

18-19. . SGA Annual Advisory Council & Management Conference—Point Clear, Ala.

18-22. . National Warm Air Heating & Air Conditioning Association—Hotel Morrison, Chicago.

December

1- 6 American Society of Mechanical Engineers Annual Meeting—Hotel Statler, New York.

1958

January

23. . NEGA Operating Division—Hotel Statler, Boston.

March

17-21. . National Association of Corrosion Engineers—San Francisco.

20-21. . New England Gas Association Annual Meeting—Hotel Statler, Boston.

24-26. . Mid-West Gas Association—Broadmoor Hotel, Colorado Springs.

31-April 2. . GAMA Annual Meeting—The Greenbrier, White Sulphur Springs, W. Va.

31-April 2. . AGA General Management Section Conference—Washington, D. C.

April

8-10. . AGA Sales Conference on Industrial & Commercial Gas—Hotel Schroeder, Milwaukee.

14-16. . National Conference of Electric & Gas Utility Accountants—Shamrock-Hilton Hotel, Houston.

28-30. . Southern Gas Association Annual Convention—Dallas.

May

5- 9. . AGA Distribution, Production, and Transmission Conference—Roosevelt and Commodore Hotels, New York.

19-21. . AGA Mid-west Regional Gas Sales Conference—Edgewater Beach Hotel, Chicago.

22-24. . Pennsylvania Gas Association Annual Meeting—Pocono Manor Inn, Pocono Manor, Pa.

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fast true pipe cuts on your power drive

Rolls are twice the usual width, double the bearing surface on pipe—sure straight start of cut . . . by hand or power drive—extra fast and easy. Pays you to see it before you buy your next cutter—at your Supply House.

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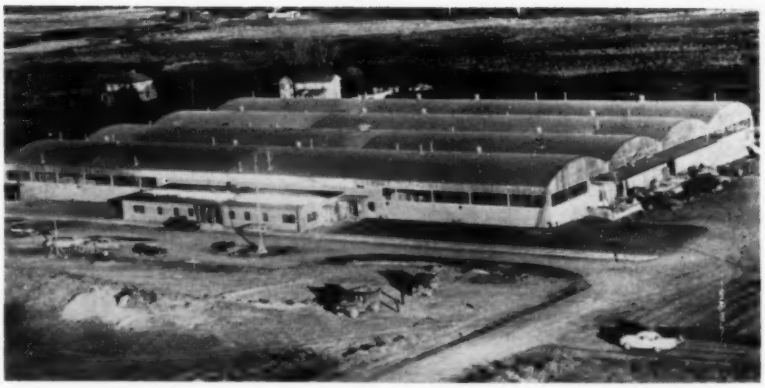
RIDGID

Work-Saver Pipe Tools

Dresser Manufacturing opens new plant

Dresser Manufacturing Division's new compression fitting plant in Wellsboro, Pa. marks the first time in Dresser's 77-year history that manufacturing operations will be carried on outside the home Bradford, Pa. factory.

The new million-dollar plant, providing 100,000 sq ft of manufacturing space, will be equipped with specially designed, high-speed, largely automatic machinery. When full production is obtained, approximately 250 people will be employed.



Dresser Manufacturing's new Wellsboro, Pa. plant is a million-dollar facility providing 100,000 sq ft of manufacturing space.

As part of the expansion move, the home Bradford plant has been enlarged to permit a 15 per cent production increase. This addition is the latest step in the continuing expansion program that has more than doubled Dresser's manufacturing space in the past 10 years.

Servel's air conditioning sold to Ark La Gas Co.

Servel, Inc., has sold its all-year air conditioning division to Arkansas Louisiana Gas Co., Shreveport, La., for $4 million. Servel stockholders will vote on the sale Sept. 11.

The stockholders also will be asked to give the company's directors authority to sell the remainder of Servel's assets when a sale can be arranged that the directors consider advantageous. The remaining property is used principally for the company's home appliance division and its general offices. According to Servel, there have been exploratory discussions with several possible purchasers of the home appliance division, but no understandings have been reached.

The sale price includes about $1 million for the inventory of the air conditioning division and $3 million for other property and assets.

Under an additional agreement, Servel agrees not to compete with the business it is selling. It is retained as a consultant in the air conditioning field by Arkansas Louisiana for $200,000 per year over a five-year period.

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ENGINEERED By.... THE WEBSTER ENGINEERING COMPANY
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Typical of WEBSTER'S leadership in combustion equipment engineering and manufacturing are four "package" burner and controls units. The ROTONETIC, DYNETIC, DUONETIC and CYCLONETIC.
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Division of SURFACE COMBUSTION CORPORATION, Toledo, Ohio

GAS news notes

Minneapolis-Honeywell Regulator Co. has opened its new $1.5 million plant in Fort Washington, Pa. The 120,000-sq ft plant is designed for production of industrial valves for automation and the nation's expanding missile program.

Tube Turns, Louisville, Ky., recently observed its 30th anniversary. The company, which produces welding fittings and flanges for industrial piping systems, was founded by M. Keith Dunham, who served as president until 1939. Walter H. Girdler, Sr., who headed the company until his death in 1945; Charles J. Haines, now president of National Cylinder Gas Co., the parent organization; and E. G. Luening.

Robertshaw-Fulton Controls Co. is relocating its executive offices in Richmond, Va.

Sanford Tractor & Equipment Co., Reno, Nev. is a new distributor for Bucyrus-Erie Co. in western and central Nevada and in northeastern California.

H. R. Basford Co., San Francisco, is distributing residential and commercial automatic gas water heaters for Ruud Manufacturing Co. Basford, which already distributes the products in California, Arizona, Nevada, and the Hawaiian Islands, has an expanded territory including Oregon, Washington, and parts of Montana and Idaho.

The ElectroData division of Burroughs Corp. has moved its Los Angeles district office to 230 N. Lake Ave., Pasadena. More than 50 sales and field engineers headquarter at the new location.

A new $50,000 plastics laboratory has been established by Stanford Research Institute, Menlo Park, Calif. The new facility will accommodate the applied-research center's expanding plastics research program.

Collins Radio Co., Cedar Rapids, Iowa, has created a systems division, expanding into the field of design, manufacture, installation and maintenance of communications systems of any scope.

Gas heating installations were 76 per cent above last year's record sales for the first six months in the three boroughs served by Brooklyn (N. Y.) Union Gas Co.

Stockholders of Carrier Corp. and Elliott Co. approved merger terms whereby Elliott becomes an operating division of Carrier. William A. Elliott will continue as president and he will also become a vice president and director of Carrier.

Bristol Co., Waterbury, Conn. has opened a new sales office in Portland, Ore.

The Mid-West Gas Association's gas meter and service school and conference is slated for Sept. 10-12 at Iowa State College in Ames. Association Vice President R. S. Stover is chairman of the program committee.

What's Briggmann looking at?

George Briggmann, UNION CARBIDE's specialist in the use of CARBOSEAL Anti-Leak, is inspecting another bell-and-spigot joint effectively sealed with CARBOSEAL Anti-Leak. Municipal gas companies have found CARBOSEAL Anti-Leak the answer to problems resulting from the changeover from wet manufactured gas to dry natural gas.

CARBOSEAL Anti-Leak swells dried out packing fibers in bell-and-spigot joints—thus, it solves four problems because it:

- *corrects leakage*
- *eliminates vegetation damage*
- *reduces maintenance costs*
- *wets down dust and rust in mains*

CARBOSEAL Anti-Leak solves these problems easily and economically too. And, it has kept joints tight for up to 23 years.

Get full details on CARBOSEAL Anti-Leak. Write for booklet 4506. A 16 mm. color-sound movie, "CARBOSEAL Anti-Leak Stops Gas Main Leakage" is available upon request. Better yet, give George a call. He'll be glad to tell you how CARBOSEAL Anti-Leak can mean increased profits for you.

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GAS people

Lester Potter
Lone Star

D. A. Hulcy
Lone Star

George Stevenson
American Meter

J. Wilson Gaw
Washington Nat.

LESTER T. POTTER is the newly elected president of Lone Star Gas Co., Dallas. He succeeds D. A. HULCY, who served as Lone Star president more than 17 years. At the request of the directors, Mr. Hulcy will continue with the company as chairman of the board even beyond his normal retirement date of Dec. 1, 1957. He has been chairman since 1952. Mr. Potter, with the company more than 29 years, was elected executive vice president in 1954, after serving as assistant to the president. Mr. Potter, at 51 one of the youngest of Lone Star's official group, has had a variety of assignments with the company. He started his career as syphon inspector in the gas measurement department at Ranger, later becoming assistant production engineer, superintendent of the production-engineering department, superintendent of the combined operations of the production and production - engineering departments when they were merged in 1941, and assistant to the general superintendent of the transmission division.

GEORGE W. STEVENSON, manager of West Coast operations, has been elected a vice president of American Meter. Mr. Stevenson will continue in charge of sales and manufacturing activities in Washington, Oregon, California, Arizona, Nevada, Idaho and the Hawaiian Islands. He has been with the company since 1928.

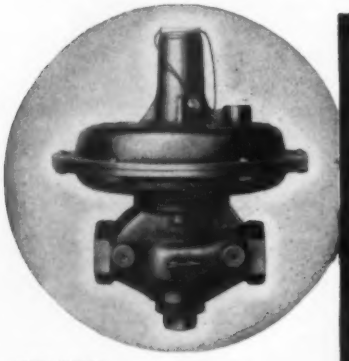
HARLAND C. FORBES, president since 1955, has been elected chairman of the board of Consolidated Edison Co. of New York. CHARLES E. EBLE has been elected president and a member of the board of trustees. Mr. Eble, who has been vice president in charge of accounting, auditing, and tax operations since 1953, began his career with the company as office boy in 1916. Vice presidents who have become senior vice presidents are JAMES F. FAIRMAN, EARL L. GRIFFITH and L. A. SCOFIELD.

J. WILSON GAW has been elected vice president for public relations of Washington Natural Gas Co., Seattle. Before becoming director of public relations, after the merger of Seattle Gas and Washington Gas & Electric companies into Washington Natural, Mr. Gaw had been general sales manager and assistant to the president.

(*Continued on page* 106)

Steady

REYNOLDS LOW PRESSURE REGULATORS



PIPE SIZES:
¼" to 8"
¼" to 3" with screw connections
3" to 8" with flange connections

Reynolds Low Pressure Regulators guarantee steady, constant, unvarying outlet pressure even though the volume varies and inlet pressure fluctuates. Precision built and delicately balanced for accurate performance on low pressure installations, the units illustrated are backed by factory tests over a wide range of operating conditions. Reynolds Low Pressure Regulators are economical and safe. Our Engineering Department is at your service.

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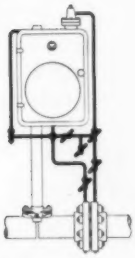
For corrosive field service...

AMERICAN® Needle Valves



Teflon-packed, forged steel American® Needle Valves stand up in the toughest meter manifold jobs and other corrosive field services without gland leaks. Stainless or carbon steel precision machined valve bodies are specially suited for welding. Stainless steel centerless-ground valve stems are designed so that the valve can be repacked under pressure.

Standard valves design rated for pressures to 5,000 psi at 70°F. For pressures to 10,000 psi, upon request, valves are hydrostatically tested and individually inspected. Valves are furnished with graphite-impregnated asbestos packing for temperatures above 450°F.

Angle or straight patterns—screwed or union bonnets.

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Glasslined and Galvanized in Upright and Table Top Models

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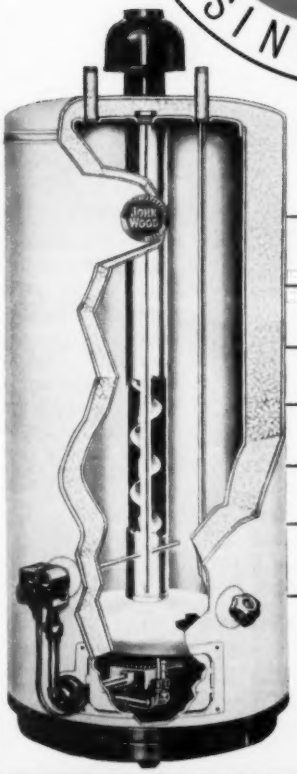
SINCE 1867



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- **Extra Heavy Tanks**
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- **Extra Heavy Insulation**
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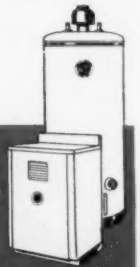


JOHN WOOD COMPANY
Heater and Tank Division
Conshohocken, Pa. • Chicago, Ill. • Red Oak, Ia.

Gas Digest

A digest of what's new in products and trade literature compiled by the editors of GAS as a reader service.

New Products and Trade Literature

For more data on any of these items use the Readers' Service Card on pages 103, 104

1. Test hole

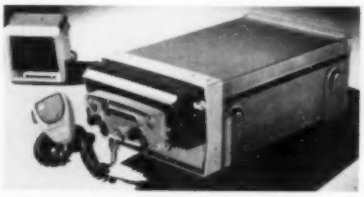
A new permanent leakage test hole assembly has been developed by Heath Survey Consultants. Featuring a neoprene insert that is self-sealing, the Auto-Test-Insert is designed to facilitate both accurate and rapid location of gas leaks in paved areas.

Important feature of the unit is that a test can be conducted instantaneously from a vehicle without use of tools or removing a cap or plug.
Heath Survey Consultants

2. Combination valve

Both back pressure and suction on meters and distribution systems are controlled with Norwalk's new combination valve. A new diaphragm assembly provides larger capacity and reduced pressure loss.

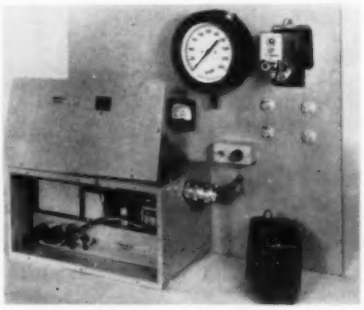
The unit meets regulations of gas utilities and municipalities who require such units to control back pressure and suction caused by obstructions and shutoff of gas supply lines in gas compressors, gas boosters, and similar installations.
Norwalk Valve Co.



3. Power supply

By using all-electronic power supplies, Motorola's new line of mobile radio units reportedly eliminates vibrator replacement problems.

Called the "T-Power" radiophones, the new two-way radio units incorporate a transistorized switching circuit in the power supply in place of the conventional vibrator.
Motorola Inc.



4. Measuring system

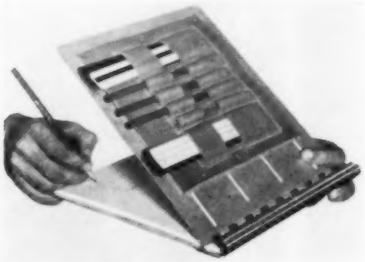
Oil Metering & Processing Equipment Corp. has available a new electronic gas flow measuring system.

The flow measuring system measures the flow of gas through an orifice plate by means of electrical signals proportional to the flow rate and accumulated flow. It is suitable for metering use in automatic well testing systems, gas sales lines, transmission lines, distribution systems, and processing systems.
Oil Metering & Processing

5. Valve-regulator

Rockwell's new pneumatically controlled, cylinder-operated lubricated plug valve regulator is designed to provide high-pressure gas regulation with minimum pressure loss.

Advantages of the new unit include operational ease and favorable flow characteristics of the lubricated plug valve, high capacity with low pressure loss, silent regulation and automatic pressure control.
Rockwell Manufacturing Co.



6. Sheet holder

Stretex Instrument's new aluminum sheet holder features snap-action covers to eliminate pressure tapes, clips and thumb tacks. Each holder has a heavy mildew-resistant

cowhide pencil and scale pouch flush riveted to the lid. The cowhide pouch in the most popular sizes is molded and compartmented to hold two standard pocket scales and four pencils of varying hardness and thickness.

The device is particularly applicable when note-taking or map-reading in confined spaces.
Stratex Instrument Co.

7. Aluminum case meter

Operating at only 7 revolutions per cu ft, American Meter's new aluminum case meter is capable of sustained accuracy through greater power and slow-speed operation.

In addition to proven tin meter accuracy possibilities, the low operating speed of the AL-250 insures minimum wear at vital bearing points, thereby reducing maintenance costs to the minimum over the life of the meter.
American Meter Co.

8. Plug valve

According to the manufacturer, the new Graham plug valve offers non-lubricated, non-corrosive, non-seizing and low maintenance features resulting in trouble-free service in a wide range of field applications. The valve is designed for control of gas, oil, water, or other fluids where full flow, quick opening is required. It can be repaired in the line, reducing down-time.

Graham's plug valve is fabricated with screw or flange-type connections in sizes ranging from 1 to 6 in.
Graham Products

9. Gas odorants

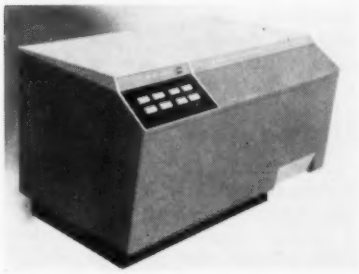
Two non-mercaptan odorants, "Gasniff" and "Macsniff," have been added to Natural Gas Odorizing's Captan line of gas warning agents.

Gasniff features an extremely flat boiling range, which makes it adaptable to all types of odorizing equipment. Macsniff is a wider boiling range odorant designed for liquid injection equipment. Its unique odor should make it especially suitable where refinery or other odors may be confused with more typical gas odorants.
Natural Gas Odorizing Inc.

10. Power pump

Greenlee's new portable high-pressure hydraulic power pump fills a need for two-speed, fast-approach operation.

The new 798-AC-SA power pump, driven by a ¾-hp, 115-230-volt electric motor, will handle a wide variety of hydraulic power applications. The pump is under constant finger-tip control at all times.
Greenlee Tool Co.



11. Computer

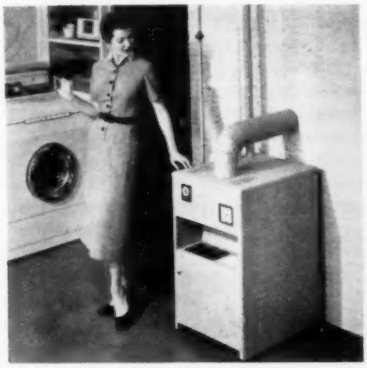
Fully automatic control for industrial process plants is possible with the use of the RW-300 digital control computer developed by the Ramo-Wooldridge Corp.

When used as a central unit of a process control system, the RW-300 automatically reads process instruments, performs necessary computations to relate readings to process objectives, determines control actions that will result in optimum plant operation, etc.
Ramo-Wooldridge Corp.

12. Wedge gate valve

Walworth's new line of 600-lb steel wedge gate valves is for gas, water, steam or air service at temperatures up to 850°F and for oil or oil vapor up to 1000°F.

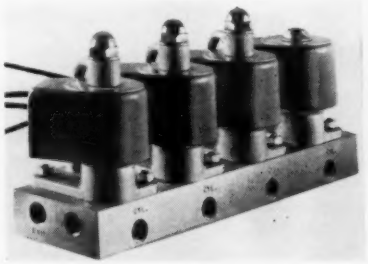
The valve has a non-shock pressure-temperature rating of 420 psi at 1000°F and a rating of 2000 psi at 100°F. All valves in the new line are of the outside screw and yoke design.
Walworth Co.



13. Gas boiler

High capacity is combined with compact dimensions in a new American-Standard gas-fired boiler.

Standing only 33½ in. high and requiring minimum floor space, the fully automatic boiler is ideal for all residential installations where space is at a premium.
American-Standard



14. Manifold valves

Two and three-way solenoid valves suitable for manifold mounting are being produced by Automatic Switch Co.

The manifold-mounting design

meets the demand for grouping a number of solenoid valves on a common body.
Automatic Switch Co.

15. Transistorized power

A transistorized power supply has been developed by General Electric's communication products department for use with two-way radio systems.

The power supply is designed to provide greater reliability in mobile radio equipment and to effect substantial savings in component replacement. G-E's transistorized power supply reportedly cuts maintenance costs for both small and large fleet users.
General Electric

16. Valve actuator

Askania's new electro hydraulic valve actuator is designed to operate from signals supplied by commercially available controllers, remote positioning devices or directly from the measuring element. The self-contained unit is designed for valves with from ½- to 1½-in. full stroke which require less than 200 lb thrust.
Askania Regulator Co.

17. Steel gate valves

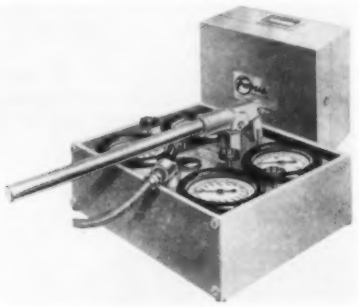
Crane is introducing three new lines of Crane 600 class steel gate valves for gas and oil service. The lines include (1) a single-disc, conduit type pipeline valve; (2) a double-disc, parallel seat pipeline valve; and (3) a smaller gate valve for general services.

Both new pipeline valve designs are suitable for service with crude oil, refined petroleum products, and gas at atmospheric temperatures. The steel conduit valves are available in sizes from 2 through 30 in.
Crane Co.

18. Forced-air furnaces

A new line of forced air gas furnaces with bottom hot air discharge for domestic heating has been developed by General Gas Light Co.

Its design and the availability of several types of warm air duct fittings make it possible for the Humphrey furnace to be installed for up-down or horizontal warm air delivery. Small size, high capacity and quietness of operation are other distinguishing features.
General Gas Light Co.



19. Tester

A utility version of the new Farris Porta-Tester has been developed for general industrial use in at-the-site hydrostatic testing of valves, pressure vessels, piping, steam generators, pump cases and other process equipment. It tests pressures up to 3000 psi.

The 55-lb unit is complete with four test-accuracy gauges and 8 ft of hydraulic, flexible tubing that packages on the rear of the cover for complete portability.
Farris Engineering Corp.

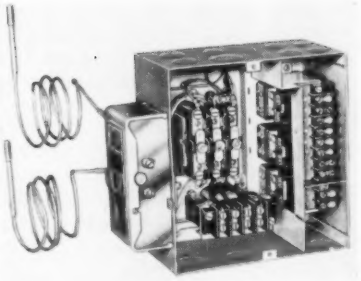
20. Compensating cartridge

Philip J. Hill's compensating cartridge can be used where it is necessary to saturate a process stream with a solid or granular chemical of a known solubility, in a process stream. In the dehydration of natural gas or air the compensating cartridge makes it possible to depress dew points more than 100°F.
Philip J. Hill & Son

21. Plug valves

New sizes in plug valves for wider applications are now available from Circle Seal Products.

Design features include dead tight shutoff through use of "O" ring flow seal and "O" rings at top and bottom to prevent external leakage. In the open position the valve is full ported and allows a straight-through flow passage.
Circle Seal Products Co.



22. Control panels

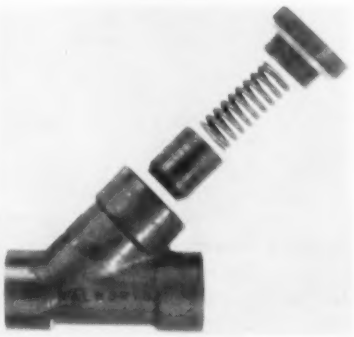
Air conditioning master control panels have been added to White-Rodgers line of cooling controls.

The new panels are available in single and two-piece types. The single—for use on package cooling units and those having water-cooled condensing units — incorporates both the evaporating sequencing and condenser sections in one enclosure. The two-piece panel is designed primarily for systems having remote air-cooled condensing units.
White-Rodgers Co.

23. Audio-tone transmission

Centralized supervisory control systems can now utilize the many advantages of transistorized audio-tone transmission. Up to 18 functions, telemetering and controlling, may be transmitted over a single pair of private or leased wires, carrier current, radio or microwave mediums.

Ease of assembly, interchangeability, installation, and system expansion are features of the compact, completely transistorized "plug-in" design of the power supply, transmitters, and receivers.
Builders-Providence Inc.



24. Plastic check valve

An all-plastic lift check valve has been introduced by Walworth. Body and components of the new valve are made of normal impact rigid polyvinyl chloride. This provides high corrosion resistance to alkalis,

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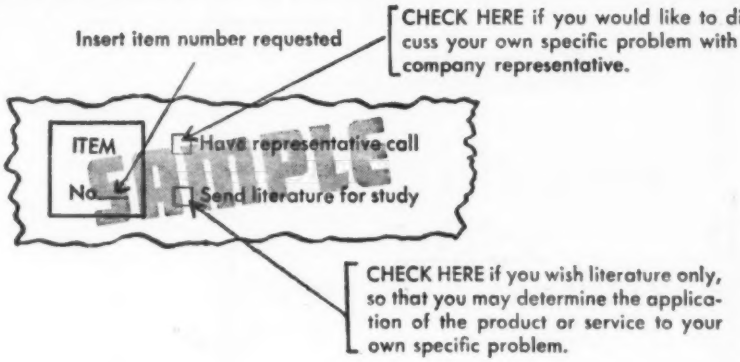
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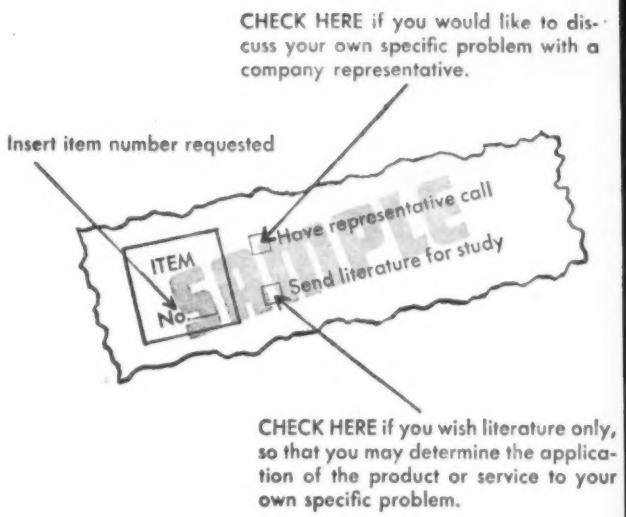
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acids, inorganic salt solutions and other corrosion flow materials.

The new PVC check valve operates at pressures up to 150 psi at 75°F.
Walworth Co.

TRADE LITERATURE

25. Tape-wrapping machine

Special features of the Plicoflex Speedmaster tape wrapping machine are presented in a new four-page illustrated brochure. Specifications and construction details on two power-operated models and three manually operated models are discussed.
Plicoflex Inc.

26. Full flow valves

Eight types of Coppus sentry full flow valves are described in a new four-page bulletin. Schematic drawings, descriptive information and specifications are presented.
Coppus Engineering Corp.

27. Utility ditcher

A new catalog from Gar Wood features the improved Gar Wood-Buckeye Model 403 utility ditcher. The eight-page color catalog is illustrated with mechanical views of all major components. Action photos are also included.
Gar Wood Industries Inc.

28. Centrifugal compressors

Cooper-Bessemer's Series RS centrifugal compressors for gas processing work are the subject of a new technical bulletin. The bulletin's 24 pages present complete construction details, engineering application data, and dimensions.
Cooper-Bessemer Corp.

29. Fittings and flanges

Technical data and installation information on unplasticized polyvinyl chloride pipe are provided in a new booklet from Tube Turns Plastics. The booklet also contains pressure-temperature charts, chemical resistance tables, support spacing formulas.
Tube Turns Plastics Inc.

30. Service bulletin

The story of Pipe Line Service Corp.'s process and method of coating and wrapping pipe at its eight plants is told in a new booklet. Also covered are the company's coating machines capable of handling all sizes from ¾-in. through 30-in.
Pipe Line Service Corp.

31. Gas thermostat

Robertshaw's new heavy duty, high capacity gas thermostat is discussed in a new bulletin. Six detailed diagrams and drawings of Model DG throttling-type thermostat are contained in the four-page publication.
Robertshaw-Fulton Controls Co.

32. Recorders

A newly designed line of Ring Balance recorders, indicators and controllers is the subject of a newly published bulletin from Hagan Chemicals. The bulletin uses arrow-and-caption treatment to explain the many features incorporated in the instruments.
Hagan Chemicals & Controls Inc.

33. Plug valve lubricant

Lubricant recommendations for nearly 4000 service conditions for which lubricated plug valves can be used are given in a new 16-page catalog from Homestead Valve. This illustrated catalog also shows lubricated plug valve accessories, fittings, automatic lubricators, lubricant guns, and gives full information for choosing and ordering correct lubricants.
Homestead Valve Mfg. Co.

34. Surface condenser

An illustrated bulletin from Southwestern Engineering Co. describes its new line of Surface condensers. The two-color bulletin is illustrated to show design and technical features.
Southwestern Engineering Co.

35. Crane-excavator

An up-to-date six-page bulletin from Schield Bantam covers the Bantam Model T-35 crane-excavator. The two-color bulletin features application and engineering data, easy-to-read charts, etc.
Schield Bantam Co.

36. Check valves

James, Pond & Clark's new four-page illustrated brochure deals with check valves—specifically with their uses and advantages in corrosive service and low pressure service, as relief valves for intermediate and low pressures; as shutoff valves for low pressure and general service.
James, Pond & Clark

37. Product literature

Five new bulletins on positive displacement meter accessories have been published by American Meter. Included in the list are the following: Bulletin 200, "Base Volume Index"; Bulletin 201, "Base Pressure Index"; Bulletin 202, "Volume and Pressure Gauge"; Bulletin 203, "Critical Flow Prover"; Bulletin 204, "Low Pressure Flow Prover."
American Meter Co.

38. Valve catalog

Just published is a new 244-page catalog covering Darling gate valves, check valves and fire hydrants in a broad range of types, sizes and construction. Catalog 57, in addition to covering the company's latest developments, includes extensive engineering data, application tips, valve accessory information, and reference data on materials, specifications and standards.
Darling Valve & Mfg. Co.

39. Aridifier

The contamination present in all air that comes from compressors, the damage it causes and the way by which the Logan Aridifier prevents such trouble is the subject matter of a new catalog. The illustrated catalog gives full information on all models.
Logan Engineering Co.

40. Lift truck

Engineering, design and construction features offered in Allis-Chalmers new FT-100 lift truck are discussed in a new bulletin (BU-334A). Specifications cover the 10,000-lb lift truck and the 230-cu in. Allis-Chalmers engines.
Allis-Chalmers Mfg. Co.

41. Strainers

Start-up or temporary strainers are covered in a new bulletin from M. N. Aitken Co. This engineering data book covers all sizes from 2 through 24 in. in the regulator flange series and the ring joint type.
M. N. Aitken Co.

42. Centrifugal pumps

A new 16-page, two-color bulletin features Ingersoll-Rand's Class GT general-purpose, centrifugal pumps. This new bulletin describes the pumps and incorporates cross-sectional drawings, installation views, and selection charts.
Ingersoll-Rand

people • *Continued*

(*from page* 98)

Frank Seitz
SoCounties

Frank Foster
So Cal Gas

Otto Manz, Jr.
ConEdison

C. W. Meytrott
ConEdison

FRANK N. SEITZ has been elected to the board of directors of Southern Counties Gas Co., Los Angeles. Mr. Seitz, a vice president of the company, has headed its sales activities since 1950.

OTTO W. MANZ, JR., has been elected executive vice president of Consolidated Edison Co. of New York, reestablishing the post which was abolished in 1955. C. WESLEY MEYTROTT succeeds Mr. Manz as vice president of sales. Mr. Manz has been with Con Edison and its predecessors since 1925. For the past year he has been in charge of the company's sales operations in Manhattan, Brooklyn, Queens, and Bronx. Mr. Meytrott has been with Con Edison since 1933—as assistant vice president since 1953.

R. B. STONE is the newly appointed vice president and sales manager of Dura-Vent Corp., Redwood City, Calif. For the past 10 years Mr. Stone has been midwestern sales manager for the Peerless Manufacturing division. His headquarters will be in Louisville, Ky., but he will retain sales offices in Chicago.

CLIFFORD E. HALL, for many years director of promotion for the AGA, has joined Heatbath Manufacturing Co., Inc., Springfield, Mass., as vice president in charge of sales. Most recently, Mr. Hall has been director of utility operations for the Coleman Co.

OWEN MCCOMAS heads up the national sales force of the Payne Co. as general sales manager of the Monrovia, Calif., firm. Mr. McComas formerly was associated with the Southern California Gas Co. and the Day & Night Manufacturing Co.

FRANK M. FOSTER, vice president of Southern California Gas Co., has been elected a member of the board of directors. Mr. Foster, who has been vice president since January 1955, will continue to be responsible for sales, advertising, and public relations functions of the Los Angeles-based utility.

EDWIN K. DALY, JR., president of Horn & Hardart Co., New York, and Horn & Hardart Baking Co., Philadelphia, is a new member of the board of directors of Philadelphia (Pa.) Electric Co. He replaces SAMUEL LLOYD IRVING, who has retired from the board.

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One bell of the instrument is filled with gas which is being measured, and the other bell is filled with dry air. Otherwise, except for the new instrument having one column for gas and one column for dry air, the unit is identical in operation to the standard gas gravitometer. When calibrated and properly installed, these instruments require little attention other than to wind the clock, ink the pen, and change the chart. Send for bulletin No. 101.

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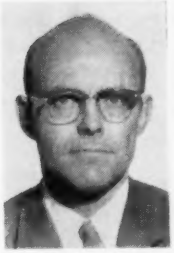


M. S. Mossholder
Dresser

John Sullivan
Dresser

Dresser Manufacturing Division, Bradford, Pa., has made several territorial changes. PERCY L. KNOTT is gas market district manager for the Pennsylvania, Ohio, and West Virginia tri-state area; DONALD V. HACKETT, district gas manager at Denver, has been transferred to Chicago district manager; HENRY F. PEEBLES goes from Chicago general markets district manager to Houston district manager; JOHN L. SULLIVAN has joined the company as general markets sales representative for West Virginia and parts of Pennsylvania, Ohio, and Kentucky; and M. STEVEN MOSSHOLDER is general markets sales representative for the Rocky Mountain region.

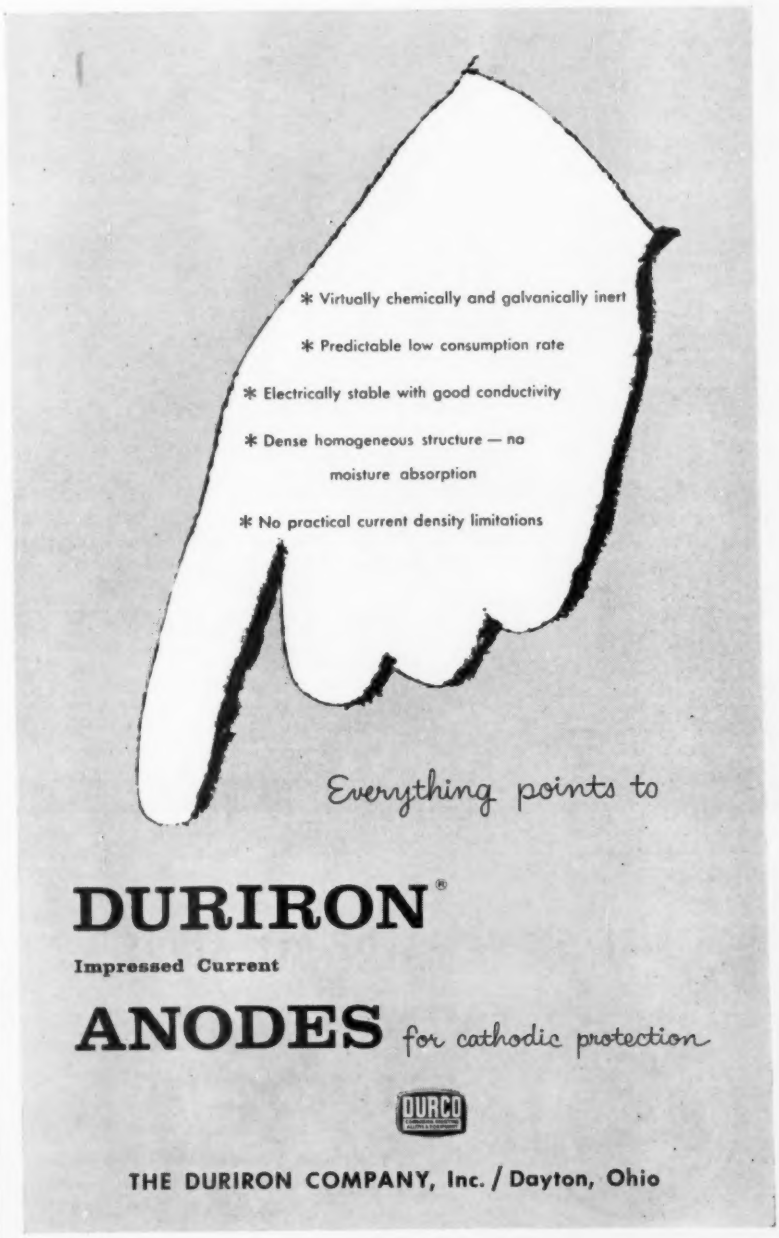
J. E. COLEMAN is the newly elected vice president and general manager of Manufacturers Light & Heat Co., Pittsburgh. He will also serve in the same executive capacity with Cumberland & Allegheny Gas Co. and Home Gas Co., two other companies operating with Manufacturers Light as the Pittsburgh Group companies of Columbia Gas system.

MRS. HELEN S. STEERS, a member of Brooklyn (N.Y.) Borough Gas Co.'s board of directors, treasurer, secretary and sales director, has retired after 43 years of active service with the company. She will continue to serve as a member of the board of directors.

R. G. BARNETT has resigned as a director and retired as vice president of Portland (Ore.) Gas & Coke Co. because of ill health. Mr. Barnett has been associated with PG&C since 1938 in charge of customer service activities.

At a recent meeting of the board of directors of San Diego (Calif.) Gas & Electric Co., JACK A. GRAHAM and CHARLES DAVIES were elected assistant secretary and assistant treasurer, respectively.

ED ROBERSON has been appointed manager of the Bremerton (Wash.) district for Cascade Natural Gas Corp., succeeding DAVE WELCH,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people • *Continued*

who has resigned. Mr. Roberson, who has worked in the company's office at Shelton as manager, will have supervision of both the Bremerton and Shelton properties.

DON JENSON has been appointed chief engineer at Chemtrol Corp., Compton, Calif.

ALLEN C. RABY has been appointed southern sales representative for Vulcan Rubber Products division of Reeves Brothers, Inc. His new territorial assignment includes Alabama, Florida, Georgia, the Carolinas, and Tennessee (except Memphis).

RUSSELL T. BRANCH, chairman of the board of Stone & Webster Engineering Corp., New York, has retired after 45 years continuous service with the company. He was elected chairman in 1955.

WILLIAM H. COCHRANE has joined the management staff of Neptune Meter Co., New York, as executive vice president and has been elected a director. In his newly created post, Mr. Cochrane will be responsible for maintaining a close liaison with the corporation's subsidiaries and coordinating policies and operations affecting administration, manufacturing and sales activities.

Paul A. Manor
Rockwell

John W. Ostler
Canadian Meter

Five promotions have been announced by Peoples Gas System, North Miami, Fla. IVAN E. BALL is now financial vice president, system; GEORGE V. JUSTIN is vice president-operations, system; CHARLES W. DAVIS, is director of operations, Peoples Water & Gas division; HERBERT T. YOUNG is superintendent of the Fulford plant; and RODNEY R. LITTLE is general foreman at Fulford.

JOHN W. OSTLER has been named president and director of Canadian Meter Co., Milton, Ont. Mr. Ostler has been vice president and general manager of the American Meter subsidiary since 1955. He joined the firm in 1937 and in 1942 he was named assistant manager; in 1950 he became general manager.

PAUL A. MANOR, chief engineer of Rockwell Manufacturing Co.'s Barberton (Ohio) valve division, has been promoted to chief engineer, central valve research and development department at Pittsburgh.

WILLIAM M. WILKINSON has been named president and SETH T. ROBERSON vice president of Natural Gas Odorizing Inc., Houston. Mr. Wilkinson was formerly an associate with the private investment firm of Payson & Trask, New York. Mr. Roberson has been with NGO for more than nine years, coming up through manufacturing, sales and research.

H. I. ALLEN heads up the technical service group of Oronite Chemical Co.'s marketing depart-

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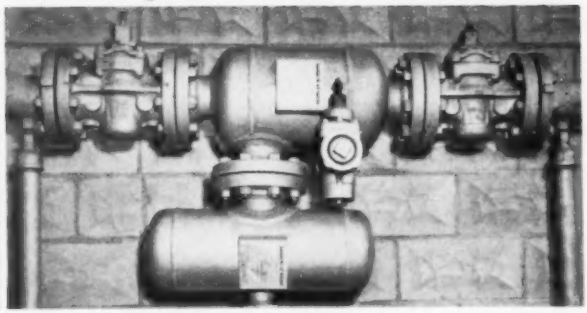

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ment. He succeeds M. P. Youker, who was recently promoted to assistant manager, western export. Also, THOMAS J. SHEA has joined Oronite as a sales representative assigned to the New York region.

WILLIAM M. MECUM is field engineering supervisor in the Los Angeles district of the ElectroData division of Burroughs Corp.

B. W. CROFT, assistant manager of Mountain Fuel Supply Co.'s producing division at Rock Springs, Mo., has become manager of the division. He succeeds the late D. K. Bowen.

VERON C. ALLEN has been promoted from service engineer to assistant sales manager of the Roanoke (Va.) Gas Co.

MUNRO CORBIN, controller of Rockwell Manufacturing Co. since 1951, has been elected vice president and assistant to the president. He is succeeded as controller by JOHN T. FARRELL.

FRANCIS A. KEANE has been elected a member of the board and a vice president of Public Service Electric & Gas Co., Newark, succeeding THOMAS N. MCCARTER to the board post. Mr. McCarter has been a director of the company since 1943 and a vice president since 1939. Mr. Keane formerly served as assistant to the president.

Spokane (Wash.) Natural Gas Co. has named D. L. CARLSON public relations director. Mr. Carlson joined Spokane Natural last year after several years in the PR department of General Motors.

L. S. STADLER has been elected vice president in charge of natural gas operations of Montana Power Co., Butte.

SAMUEL A. GAREE is now manager of operations for the Gas Machinery Co., Cleveland. In his new position, he is coordinating and supervising the operating departments required for processing orders from estimating and engineering to fabrication and delivery.

CHARLES W. STEWART has been appointed assistant to the president of Lancaster (Ohio) Meter Parts Co. For the past nine years Mr. Stewart has been associated with Sprague Meter Co., first as research engineer. In 1951 he became chief engineer.

Deaths

HUDSON R. SEARING, 62, chairman of the board of Consolidated Edison Co. of New York, died recently. His death ended a 48-year career that began in 1909 with his employment as a telephone operator with the New York Edison Co. and led to his election as president of Con Edison in 1949 and as chairman in 1955. Mr. Searing's leadership was expressed in avenues as diverse as the application of electronic data computers to accounting operations and the conversion of Con Edison's gas territory to natural gas.

D. K. BOWEN, 59, manager of the producing division of Mountain Fuel Supply Co., Salt Lake City, died recently in Rock Springs, Wyo. His accumulated service to Mountain Fuel and its predecessors amounted to approximately 39 years. Mr. Bowen held cancelled payroll check Number 1 as a memento to the early days of Mountain Fuel, having been with the company since its conception.

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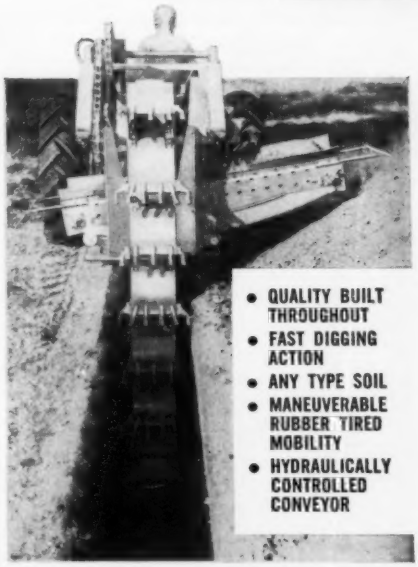

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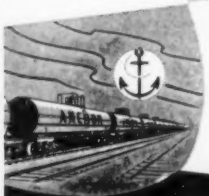

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GAS associations

Workshop sessions highlight safety meet

The AGA's ninth annual accident prevention conference will be held Sept. 17-18 at the Sheraton-Jefferson Hotel in St. Louis.

Highlight of the conference will be a comprehensive safety workshop session featuring seven simultaneous group meetings to discuss the most common accident problems in the gas industry.

Charles Williams, Gas Service Co., heads the workshop, which will provide the background for the first showing of the association's new safety flip charts. Group leaders for the workshop are Charles T. Cummings, Hope Natural Gas; John O'Toole, Utilities Mutual Insurance Co.; Stanley Owens, Transcontinental Gas Pipe Line Corp.; William J. Easton, Cincinnati Gas & Electric; Vincent A. Howell, Long Island Lighting Co.; E. E. Taylor, Southern California Gas Co.; and M. B. Travis, Northern Natural Gas Co.

E. C. Baumann, Public Service Electric & Gas Co., will preside over the two-day conference as chairman of the AGA accident prevention committee.

Speakers at the opening session will include H. Reid Derrick, president of Laclede Gas Co.; Stanford Downey, safety director of Southern Natural Gas Co. and chairman of the Safety committee of the Independent Natural Gas Association of America; and Robert W. Otto, Laclede board chairman and second vice president of AGA.

Kansas planning measurement institute

The fifth two-day gas measurement institute at Liberal, Kan. will be held Oct. 15-16.

Sponsors of the two-day session, held in American Legion Hall, are the University of Kansas and the Southwest Kansas Petroleum Industry.

Washington • *Cont'd.*

(*from page* 17)

Pacific Gas & Electric and Canadian Bechtel are the prime movers in the proposed new 1300-mile line.

Legal observers in Washington quietly speculate that El Paso will have to tread carefully to use the proposed Canadian import line as a defense in the antitrust case, without inviting competition when the proposal eventually comes before the Federal Power Commission.

Thus it becomes obvious that any broad arousal of the Canadian gas question is likely to touch off heated debates, and perhaps actions, which would seriously affect would-be importers of Maple Leaf gas.

Throughout all of these budding battles — Canadian imports, the natural gas bill, alleged monopoly in the gas industry—the industry as a whole will be the target of some wild charges. For the gas firms, distributors, pipelines, or producers, who will simply be sitting on the sidelines, the results won't be pleasant.

* * *

FORCES opposing the use of highway funds to reimburse utilities for relocating facilities during construction of the nation's multi-million-dollar network of new superhighways gained some support this year. But they failed to outlaw utility reimbursement.

For at least another year, utilities affected by highway relocations in about a score of states will be repaid for the heavy costs of moving pipelines, poles or wires.

The 1956 federal Highway Act, in which the government agreed to pay for 90 per cent of 41,000 miles of new interstate routes and 50 per cent of a huge number of miles of intrastate highways, authorized the use of federal money for utility reimbursement in states in which it was the policy.

Measures to approve utility reimbursement were sponsored in 38 of the 45 state legislatures which met this year. The measures were defeated in 15, vetoed by governors in five, and approved in 15. In three states, the outcome is still in doubt.

Opponents of reimbursement, mostly so-called "highway users" —truck and bus operators and large shippers—term relocation a "raid on the highway trust fund."

Legislation was introduced in Congress this year to ban utility reimbursement with federal funds, but failed to get anywhere. It will still be pending when Congress reconvenes next year, and a red-hot effort to get it through is expected by supporters.

Rep. Robert E. Jones (D.-Ala.) was the sponsor of two bills this year aimed at blocking further utility reimbursement. One bill, H. R. 6987, would provide that in the future no federal funds could be be used to reimburse utilities for relocation on any federal-aid highway unless it is part of the cost of right-of-way. This bill would also prevent any utility from locating on the right-of-way of a federal highway, except to cross it. ■

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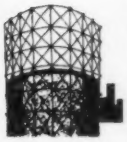

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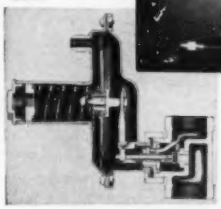

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Canadian Report

(*Continued from page* 54)

position foreman type. Those companies who have been established in the gas business—manufactured or natural—have a problem, but not as great a one as those new companies serving new territory. The established company at least has a set up where new employees, to handle the company's expansion, can be trained.

As an indication of what the manpower requirement may be to serve the present potential of 1,275,000 customers, the employee ratio in the gas utilities in the United States is one to every 140 customers. Applying this ratio to the potential customers in Canada would result in approximately 9000 employees. In my own companies—who produce and transmit as well as distribute—the ratio is one to 157 customers. That figure does not include casual labor employed during the construction season.

Even with all the political hulabaloo, I don't believe the average Canadian citizen has any realization of the magnitude of the effect natural gas is going to have on the economy of his country and on the comfort of himself and his family—because of a few holes dug in the fertile soil of Alberta. It is up to the gas industry to keep the public informed. ■

This article is adapted from a talk presented at the annual meeting of the Canadian Gas Association held at Jasper National Park, June 1957.

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A GEM OF A FABLE

Once upon a time there was a small village. In this village there lived people much like you and I. It came to pass that one day the village millers fell to talking amongst themselves, wondering at great length wherein they might sell more flour to the bakers.

When the bakers were told of the millers' desires, they replied most logically that they could indeed buy not a dram more flour unless they could sell more bread. Whereupon many of the millers devoted but a little time, effort and coin to telling the populace the virtues of the bakers' products. Then all the populace did indeed consume more baked goods—then the bakers required more flour—then the millers, well, the millers lived happily ever after.

Moral: *In the gas business, too, both suppliers and utilities will benefit by "selling" gas to the consumer. Now is the time to earnestly support the Gas Equipment Manufacturers' program.*

Be sure to see the GEM Section; pages 59 to 73

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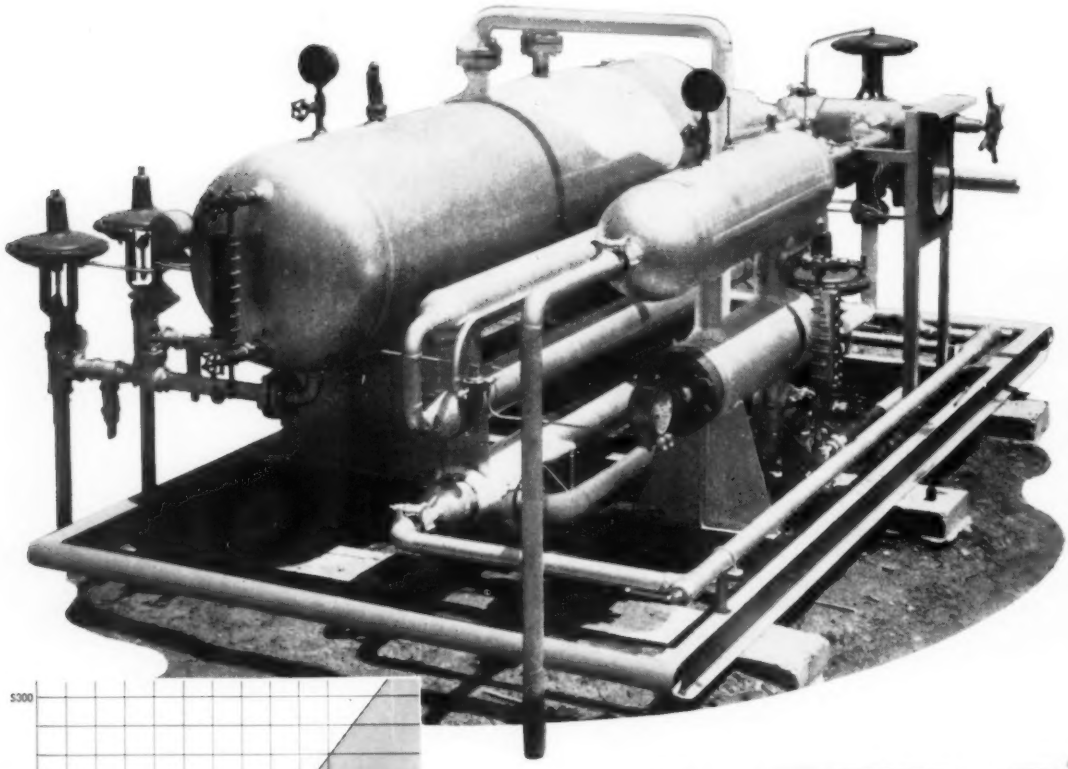

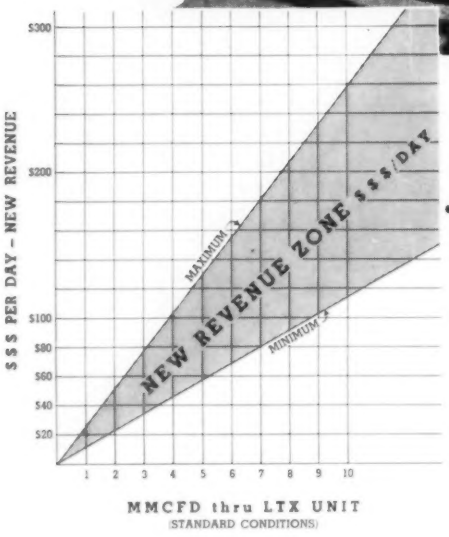

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* T.M. Reg. U.S. Pat. Off.

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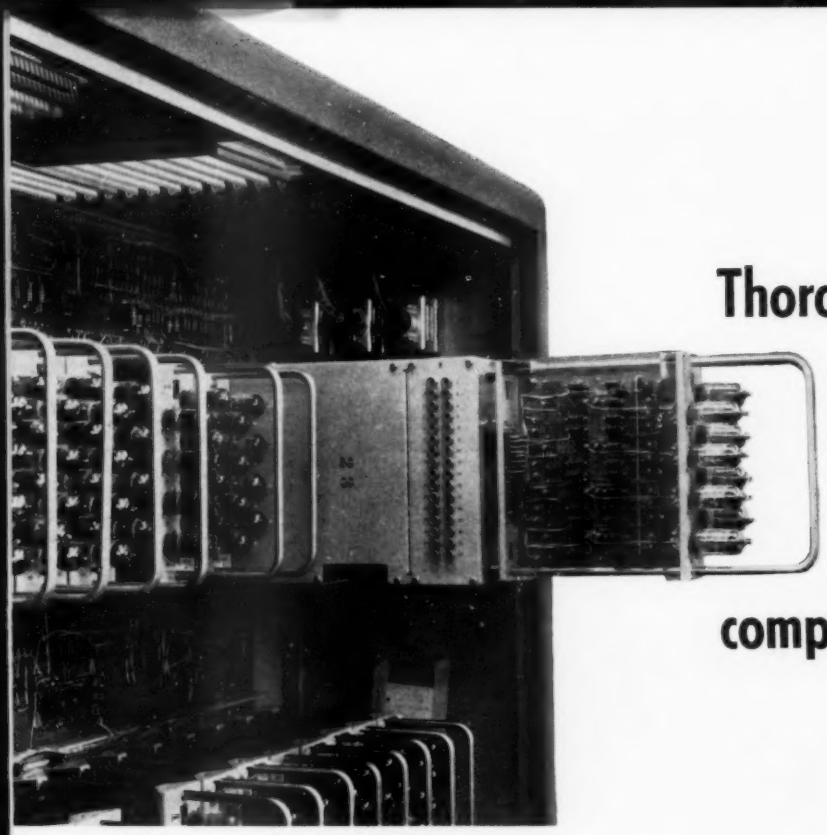


Thorough investigation shows pipeline how to use computer to advantage

GAS exclusive

By J. J. FRANKS, Director of Data Processing
Northern Natural Gas Co., Omaha, Neb.

As far back as 1953 three departments in the Northern Natural Gas Co. — engineering, measurement and accounting — became interested in the possibilities of electronic computers. In the early investigation stages the engineering department considered the use of both analog and digital computers while the other two departments were interested primarily in digital computers.

In mid-1955 these three departments plus several others in the company were pretty well convinced that a computer could be a most useful addition to the data processing operation provided one could be found that would be versatile enough and economical enough to do work for all departments concerned.

Since the company had already decided that a computer could be put to work on company business, the principal consideration in the feasibility study was a determination of, first of all, how large a computer to buy and, secondly, which one of the various computers available would be most adaptable to the jobs to be done at Northern Natural Gas Co.

Several visits were made by representatives of the various departments concerned to other companies which were using computers and also to manufacturing plants. Comparisons were made of cost, speed, versatility and ease of operation, and in February 1956 a decision was made to lease a Datatron computer to be delivered in May 1957.

Because the Datatron was destined to do work for several departments in the company, it was decided by the management to establish a data processing department separate from all other departments and reporting to the vice president in charge of long-range planning. This data processing department, when in full operation, will consist of the present punched card department as one operating section, the Datatron computer operation as another section, and a small staff of programmers as another section.

From the beginning it was planned that the programming staff would consist of experienced personnel from within the company and that no outside "experts" would be brought in for the programming job. The company took the position that it would be easier to teach experienced company personnel how to program a computer than it would be to teach

GAS

SEPTEMBER 1957

an experienced computer programmer the natural gas business.

Representatives were chosen for the programming staff from accounting, measurement, gas supply, marketing and internal audit departments. In addition, four engineers were selected to work separately on programs of a strictly scientific nature.

This programming staff was selected on the basis of recommendations by various department heads and a series of tests designed to determine the person's adaptability for this type of work. All of the people selected were released from their present jobs and assigned to work on the programming staff on a long-term loan basis. The period of time that they would spend with the programming staff was left open, but with realization that it would be from a year to two years depending upon the length of time required for the various operations to which they were assigned. Shortly after the computer was installed some reduction was effected in this programming staff and several people were returned to jobs either in their original department or wherever else they were most needed.

As soon as the programming staff had been selected a long-range schedule was laid out for training, research, programming, debugging and installation of the computer to be effected between April 1956 and September 1957.

All of the personnel selected for programming were sent to a one-week introductory programming course in Chicago early in April. This school was conducted by ElectroData Division of the Burroughs Corp., manufacturers of the Datatron. At the end of this schooling the group spent several weeks evaluating the things that had been taught in the first week of formal schooling, being introduced to IBM punched card equipment and other office machines and studying all of the material available on data processing theory and practice and in preparation for a second school held during the months of May and June in Pasadena. This second formal school was three weeks in length. The first section, during the month of May, concentrating principally on engineering and scientific training, was attended by the representatives of the engineering department. The second section, in the month of June, was aimed primarily at business applications and was attended by the remainder of the programming staff who would be interested principally in business data processing applications. After completion of the second formal schooling session considerable time was devoted to training in punched card applications and general systems work. Simultaneous with this training, research was begun on the various problems destined to be programmed on the computer equipment.

The systems training involved such things as source document design, final report design, layout and design of punched cards and internal orientation on the nature of our problems. This latter phase consisted of a series of conferences conducted by the programming staff itself to familiarize each person in the group with the specific problems encountered by each of the departments represented. We felt it was of utmost importance that all of the programming staff recognize the requirements and desires of each of the departments involved in order that each member of the programming team would understand the other's problems.

While this was the last step as far as formal training is concerned, the process of training

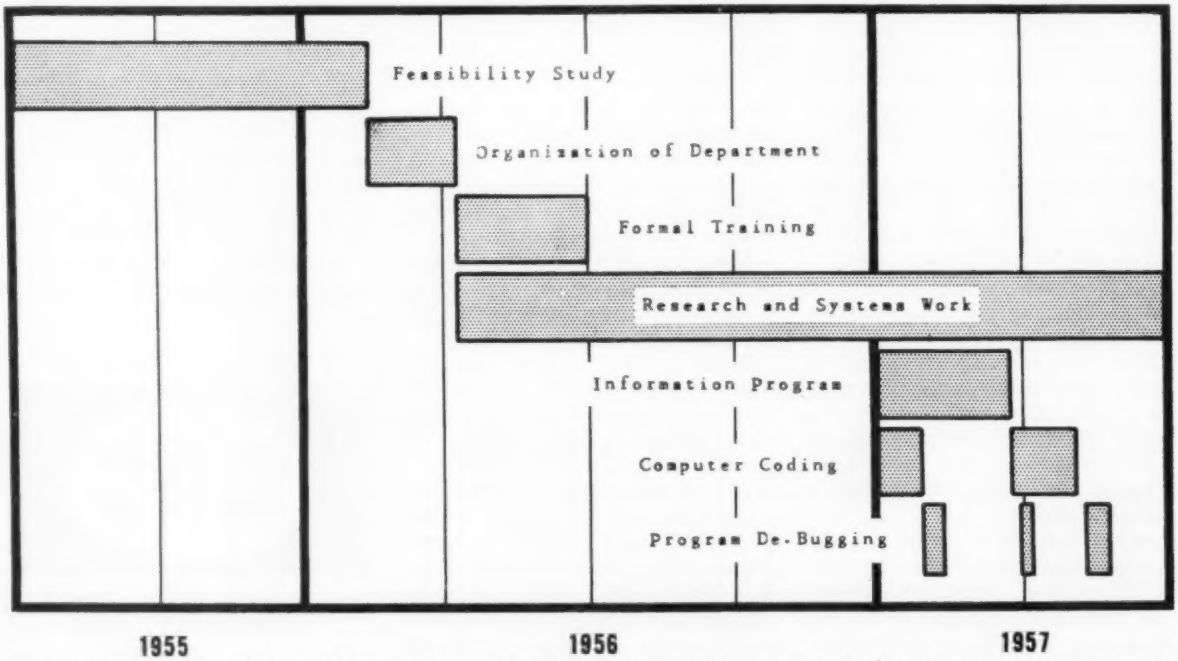


Chart represents the elapsed time of the major phases of development for the business and engineering data processing program at Northern Natural.

goes on continuously as new things are learned about the computer equipment, techniques, and the specific problems involved.

Since the engineering representatives were concerned only with scientific problems, they were not included in this series of orientation meetings. They began the actual programming of the computer almost immediately after the completion of their second schooling session. This group has continued its work independent of the business data processing group since that time.

The first phase of systems work began almost at the beginning of the research project since it consisted of, first, the broad flow charting of the problems to be undertaken. Then as more and more became known about the job to be done, the systems work began to break into detailed sections by the various departments affected. At this stage it was possible to begin the chore of forms design, punched card design, magnetic tape record design and the second level of flow charting of the problem.

During this period of time many sessions were held with department heads and key personnel from each of the departments to be affected. Since the data processing department was to be a service organization, it was of the utmost importance that each of the department heads and key people have a hand in the design of the system to be used and have the opportunity to make very clear to the programming group what their requirements and desires would be in the final analysis.

Our feelings from the first have been that the systems job is the key to establishing electronic computer operations. We had estimated that 85 per cent of our working time would be devoted to systems work and only 15 per cent to the task of program writing. Experience to date has borne this out. Our feeling at this point is that, if a comprehensive and accurate job of systems work has been done, the chore of writing the computer program becomes relatively easy.

With the exception of some practice code writing, no formal computer coding was done on the business projects prior to Jan. 1, 1957. During the month of January, three major computer programs were written. Each of these programs was laid out in a very detailed flow chart by a two-man team. From this flow chart (at command level), the machine code list was written. The next step was a "desk debugging" routine which was done by a second two-man team. The final step was a second desk debug by still another two-man team. This process provided a very thorough audit of the logic and accuracy of the coding. It was done in four weeks, the first two being devoted to writing the program, and one week for each desk check.

Northern Natural programmers prepare to "machine debug" the electronic computor at the manufacturer's plant.

In each case the job requires the use of magnetic tape input and output, punched card input and output, punched paper tape input and report writing on a high speed line printer. An electric typewriter also is used for monitoring and printing out exceptions or errors.

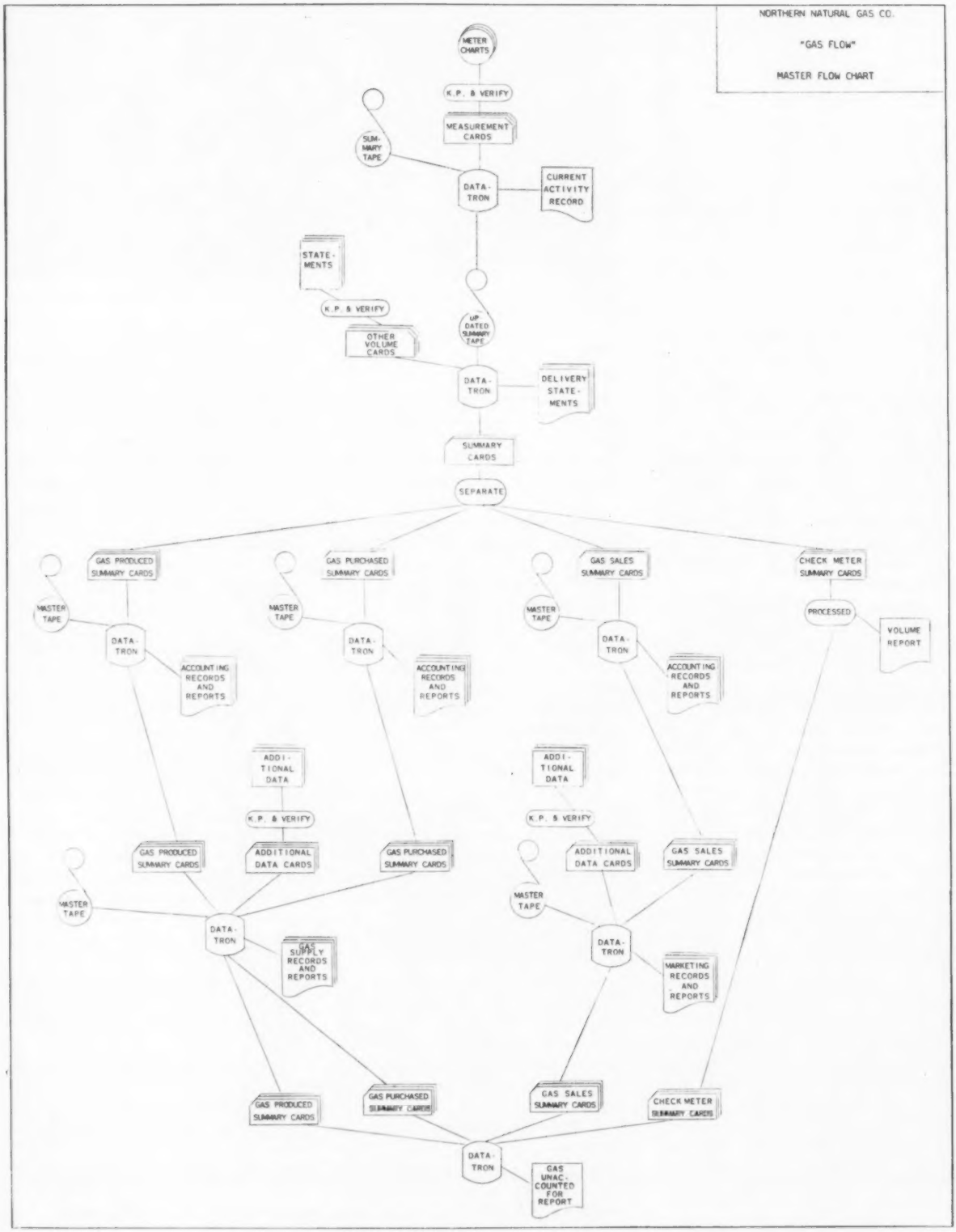
A number of minor loading programs also were prepared during this time. They were for such things as recording record data on magnetic tape for the test, loading programs, format bands, etc.

During the first two weeks in February a group of programmers took the three programs previously mentioned plus several engineering programs to Pasadena and machine debugged all of them. The machine debugging process showed up only relatively minor errors in program writing and proved conclusively the value of the desk debugging that had been done prior to our machine tests in Pasadena. Since this was the first opportunity that any of the group had had to operate the equipment, much of the time was spent in operator training.

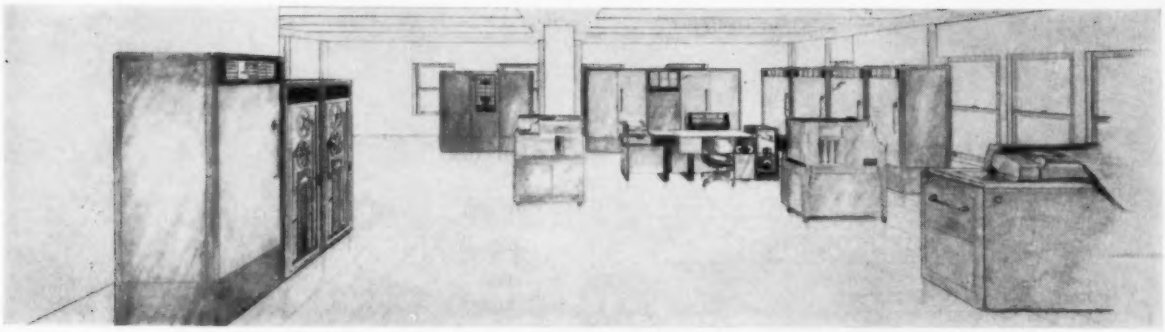
As a result of the first machine debugging routine, some refinements were made of the major programs. Another debugging session was scheduled for mid-May at which time more lengthy tests could be made on larger sections of the actual work which would pass over the computer.

Because the advent of a computer installation tends to arouse mixed emotions in any company, the management deemed it advisable to keep personnel advised of the intent and progress of the department. A series of articles in the company news magazine served to announce the order of the computer and to tell in general terms what people were involved in the programming project and what kind of operations were being adapted to computer processes.

In addition, a two-stage series of five one-hour meetings was held, first for the top officer group and later for department heads, supervisors and other key personnel. By means of movies, slide films, charts, and question-and-answer sessions, the subject of computer principles and applications was covered quite complete-



Northern Natural's master "gas flow" chart showing the computer's functions.



Artist's sketch of computer installation of Northern Natural Gas Co., Omaha.

ly. These meetings also allowed an opportunity to appeal for assistance and participation of all key people in the E.D.P. program.

The foregoing has been devoted primarily to organization and development of the data processing operation and has not described the actual jobs being programmed. Our "gas flow" project begins with meter charts immediately after they have been integrated by the measurement department. The integrator stop-and-start readings are posted on the daily or weekly meter charts and are then passed to the data processing department where one punched card will be created to represent each chart processed. This punched card will then be entered into the Datatron along with historical magnetic tape records and the calculations will be made to determine the volume of gas that passes each input and output station each day. As the calculations are made, a daily activity record is printed out on the line printer. A punched card will be created for statistical purposes for each chart and the magnetic tape will be updated for each day's activities. At the end of the month delivery statements will be prepared for all stations and additional statistical punched cards will be created as a result of the delivery statement preparation.

From the basic measurement information, plus additional volume and rate data, it will be possible to prepare monthly a series of division of interest statements to account for gas royalties to all royalty interest holders for gas produced and purchased. Other accounting vouchers, gas produced vouchers and gas sales vouchers as well as basic information for monthly financial statements.

At the completion of the accounting portion of the job various statistical and analysis reports will be prepared for the gas supply department involving data on gas purchased and gas produced and a series of statistical and analysis statements will be prepared for the marketing department for all gas sold.

For each of the aforementioned groups of reports, the process will consist of a combination of the current month's source information being processed in the computer with historical information stored on magnetic tapes from previous month's or previous year's operations.

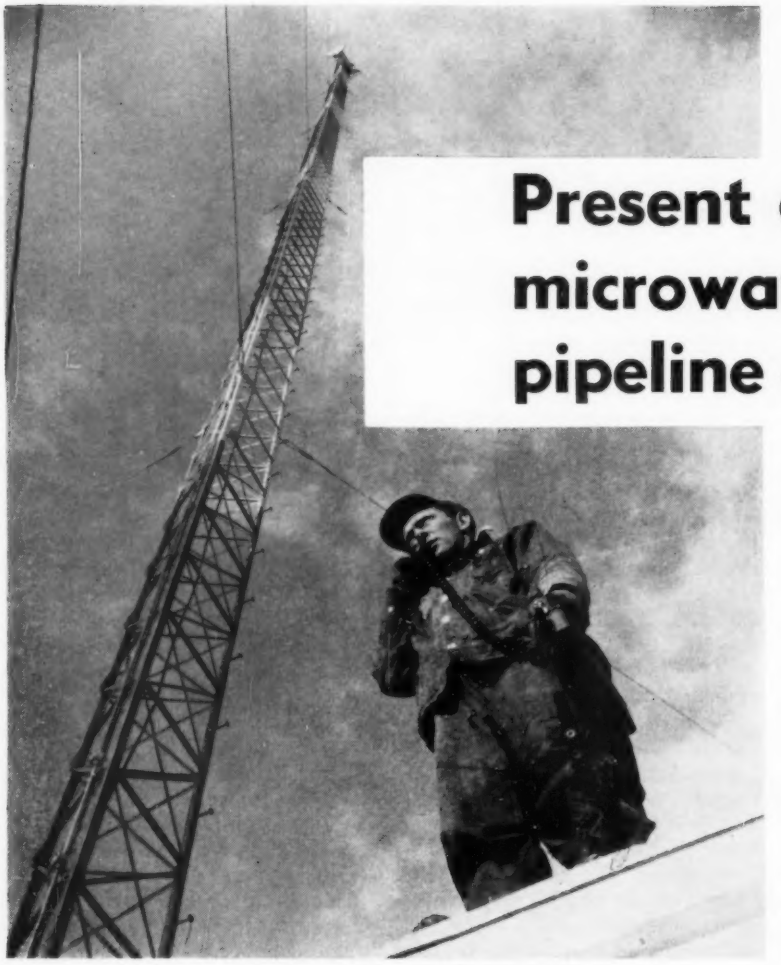
The computer arrived in our office on May 21. After a series of checkout and test runs the first computer application began with actual records in the month of August. The first cut-over process involved about 325 producing stations. This consists of about 10 per cent of the total job to be undertaken. It is expected that further cut-overs will take place each month for a period of five to six months until by year-end all stations should be on the electronic data processing system.

The principal consideration of computer use for engineering purposes at Northern Natural has been the problem of pipeline design. The engineering group is in the process of constructing a mathematical model of the pipeline system for the computer. When completed, this mathematical model should be of inestimable value in assisting the engineering department to determine requirements of pipe, horsepower, etc., for the addition of new facilities as required.

The first model will be only the mainline system and once this is completed, the various branch lines will be added and, finally, the entire gathering system will also be added. It is expected that approximately a full year will be required to program this engineering model with the first phase, the mainline section, scheduled for completion in August 1957.

It is obvious that, once completed, this computer model of the system can be used for such things as determining more accurately the total system's capacity to absorb or distribute gas, the determination of maximum efficiency of the system from an operating standpoint at both peak capacity and minimum load levels.

The management at Northern Natural has felt from the outset that the principal value of a computer for this company is not in the area of clerical savings but rather in providing the management with timely information to enable the company to manage its affairs more effectively. For this reason, relatively little consideration has been given to the application of such standard operations as payroll and materials and supplies accounting and various other administrative jobs. Since these jobs are presently being performed on modern and efficient business machines, and since the procedures are up to date and satisfactory to the management, it is likely that future computer use will be in areas of engineering research, statistical and forecasting applications for operating as well as administrative departments. ■



"Good communications pays, it does not cost."

Present and future microwave system—pipeline style

By F. VINTON LONG
Texas Eastern Transmission Corp.,
Shreveport

THE gas and oil industry has been pioneering point-to-point, high-frequency communication links for many years. Twenty years ago, the Mene Grande Oil Co. installed the forerunner of our present microwave systems across the Orinoco river between Ciudad Bolivar and La Pena, Venezuela and it worked quite well. We had the pioneering spirit then. We thought that the operating frequency of 67 megacycles was quite high, but we found very little equipment available that would provide stable operation at those frequencies. World War II, of course, spurred activity in development of higher-frequency equipment and from pre-microwave links on 67 megacycles, the equipment gradually became available for operation on the 900, and then the 2000, and the 6000, and now the 11,000 megacycle bands. It is only a time until we go still higher. Possibly up to 50,000 megacycles or into the infrared spectrum.

When this happens you will find that the pipeline companies, as usual, will take a calculated risk and prove-in this equipment as we have in the past.

I will have to admit that when I installed that first link across the Orinoco river, I did not know that I would help in the design of remotely controlled gas compressor stations in the United States which would be controlled over microwave links and designed for TV supervision which would be transmitted over the same links.

Even now we have just started.

One of the pioneers in 900 megacycles and above was the Keystone Pipeline Co. of Philadelphia. It started the whole thing here in the United States. Later, in 1950, Transcontinental Gas Pipeline Co. took a gamble and installed an 1800-mile system from west Texas to New Jersey. This is still the longest private microwave system in the country. Texas Eastern installed systems in 1951 and 1953 and has the largest system by number of stations in the United States. An interesting development has been the joint-use systems with the expenses shared by several

companies. An example is the Sinclair Continental "SINCON" system from Ponca City, Okla. to Houston. SINCON has the largest number of channels now operating on a pipeline with about 20,000 channel-miles in use.

The development and growing pains of these systems installed in the 1948-to-1953 era were sometimes intense as is usually the case when we try something new. We feel, though, that managements of the oil and gas industry are cognizant of the fact that the art is improving all the time. We certainly see no trend to tear down existing systems and start over with some other method.

The pipeliners, and other industrial users of microwave, do need better and more reliable equipment. The manufacturers are more than able to provide it if the customer demands it. The customers will demand it when customer management becomes more familiar with the fact that high quality equipment is a saving—not an expense.

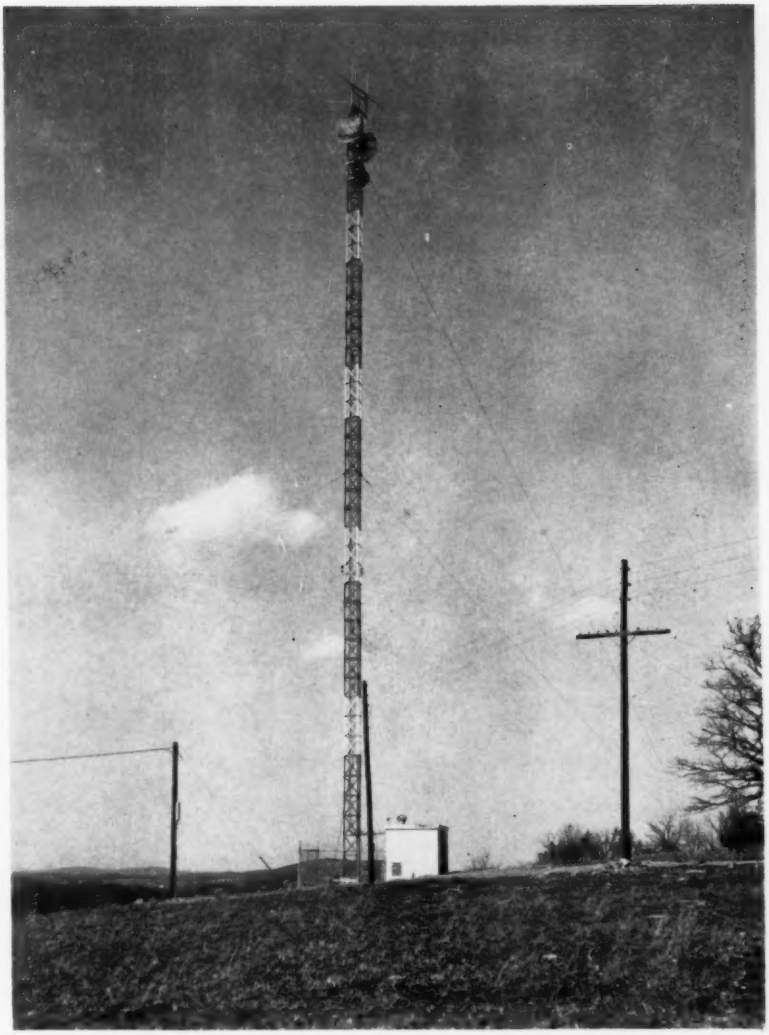
As of today, the gas industry alone has installed and placed in operation about 750 microwave stations to provide approximately 12,000 route-miles of microwave facilities carrying over 100,000 channel-miles of telephone-type circuits.

A recent study of the existing gas transmission systems' long-range plans indicates the need for between 26,000 and 39,000 additional route-miles of microwave facilities to accommodate their requirements for the next 10 years.

As of this year, the gas industry has in operation about 160,000 miles of transmission lines and about 52,000 miles of field and gathering lines.

It is estimated that by 1965 we will have 218,000 miles of pipeline and 72,000 miles of gathering lines.

It must be kept in mind that the majority of presently installed gas transmission systems do not employ microwave systems. Some of the pipelines were installed many years ago before microwave was available. As yet, many of the companies have not ventured very far to the use of telecontrol, data handling, and computing. Therefore, we can anticipate a steadily increasing use of microwave.



A typical Texas eastern relay station at a Tennessee location.

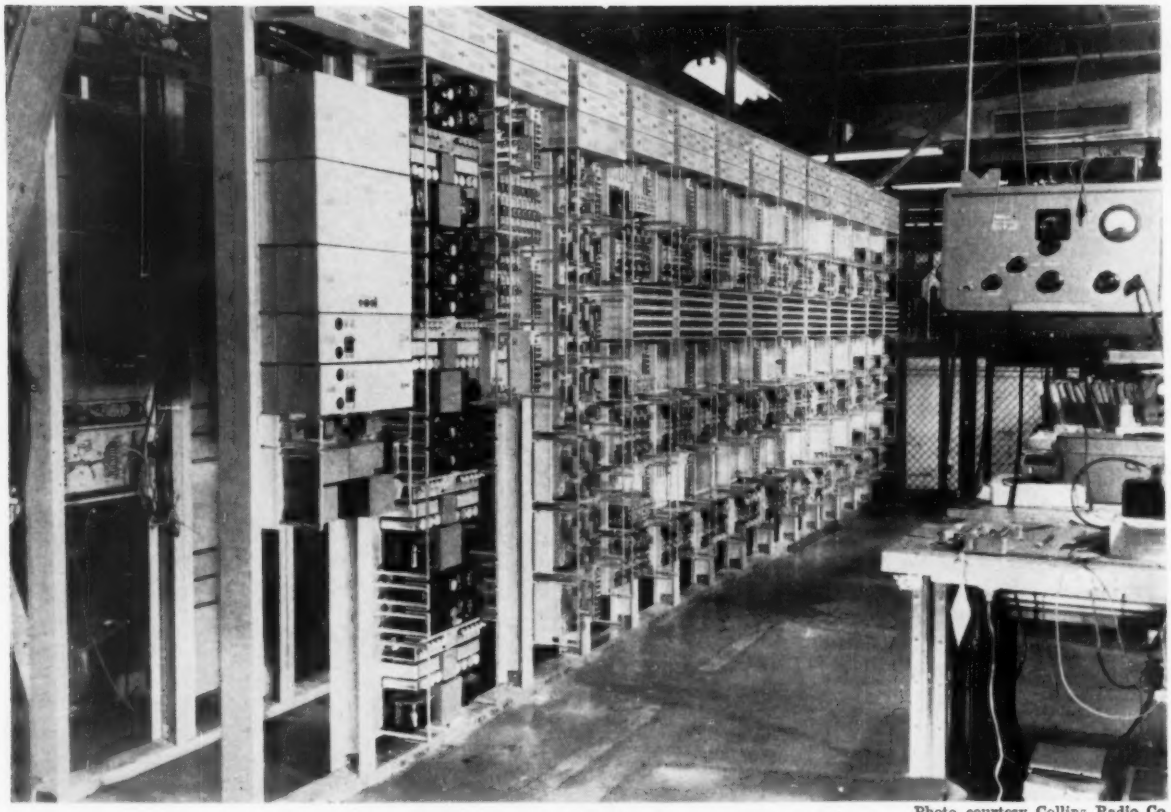
One of the facts of life that must be impressed on pipeline management is that they do not save money by installing a minimum design microwave system. Like buying a horse or taking on a wife, it is not the initial cost but the upkeep that hurts. The same thing applies to other users of microwave, particularly in the industrial service.

Industrial microwave—and especially pipeline system microwave installations—must be so designed that they will go on and on without maintenance cost and calls.

Both the microwave equipment manufacturer and the management of the customer usually do not know that many times it will cost $50 or more plus the outage time for just one maintenance call to replace a 15-cent resistor. This might not have needed to be replaced if it had been a 20-cent resistor. The same thing goes for tubes and coils and the other equipment which makes a microwave system.

Maintenance cost on a pipeline microwave system can usually override the initial cost on a 10-year basis. On a long-term basis, this is the only way that you can actually determine just what communications are costing.

The manufacturer can supply the highest quality equipment if the consumer can be shown that he is saving and not spending if he buys a good microwave system. Unfor-



Radio equipment room of a 120-channel microwave terminal.

Photo courtesy Collins Radio Co.

tunately, management usually does not know the excessive cost of high-maintenance systems. Unfortunately, the communications engineers responsible for such systems hesitate to bring out strongly just what is happening to their budget. That is just human nature.

But the consumer engineers can and have the responsibility to bring out to management in the future the amount of hot water they get into when they are saddled with a cheaper initial cost, high maintenance requirement system.

When we build a pipeline it is engineered to operate for many years. Good money is paid to insure heavy duty, rugged, reliable engines; compressors; and other components; and no expense is spared to do this because in the long run it is a saving.

Why in the world we can't convince everybody that communications equipment should be procured on the same basis, I don't know. But, we should try to change this. I believe that it is now being done; but it is up to all of us—the manufacturers and we the consumer engineers—to rise out of our easy chairs and start preaching to everyone the facts of communications life as we know them.

I am not going to try to tell the manufacturers just how to run their business or how to do these things. I do want to bring out the fact that there is a need for two entirely separate breeds of cats as far as microwave techniques are concerned. The first breed, and I believe the most important, is the way in which an unattended relay station is engineered. It must operate day in and day out without maintenance calls. It must have a fool-proof power supply. It should be designed as an unattended repeater station and not be a terminal station as we now know them.

To get on the subject of station signal alarms, I think the best alarm is none at all. If you must have some, I think a simple fail-safe type should be used with possibly one tone from each station which is "on" continuously and which holds up a relay and lights a bulb at the alarm-receiving point. If the lights are all burning, all is well. If one goes out, the maintenance engineer can pretty easily tell which station is in trouble. He doesn't particularly need to know just what has gone wrong.

We do not need buildings for relay points. We do not need relay points to be engineered to have drop outs or service channels or alarms or anything. This station should bring a signal from one direction and pipe it out in the other direction. It should involve only the barest essentials required to do this *one thing*. In many cases, the equivalent of one vice channel, in each direction, will do the job.

The equipment that goes into these unattended relay stations will be mounted on low poles or towers. They will probably be powered by some sort of d-c or storage battery arrangement. It will consist of completely transistorized gear contained in several little black boxes. These black boxes will be plug-in transistorized modules. Probably each box will be permanently

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sealed. The entire station will operate on 12 or 24 volts d-c, probably powered by storage batteries—charged by conventional a-c power, if available. If that's not available, by other means such as solar batteries, wind turbines or solar engines running d-c chargers, etc. There will be very little power required because they will have no buildings to heat or cool. And, we will have no tower lighting to fool with and we will have no gadgets. The entire lot of equipment can sit out on a fence post or on the side of the tower as it is in weather-proof housings. Probably, on the first go-round, the easiest way of providing these small transistorized, short-haul relay links would be to use a klystron operating on the 4000- to 7000-megacycle band or possibly higher. A klystron with low power seems to be the simplest thing, so far, which might be used with the rest of the equipment composed of transistors. The klystron will be contained within a large Stryofoam or plastic container with a very small thermostatically controlled heater to keep the thing on frequency. In this case we are not worried about size. The Stryofoam container might be 2 ft or more across. The high-voltage supply will be a flip-flop circuit, using transistors, and with the proven long life of the klystron, this should be a simple and reliable installation. It will probably hold good until some of the new techniques announced by the Bell Labs and MIT are available, or until transistor oscillators are available for the frequencies we wish to use.

The antenna will be the type best suited for the job. If it requires a 28-ft concentrator for use at 7000 megacycles, the design engineer would use it. There will be no hard drawn limit to the size or the type of antennas available for use in these systems. The only reason that variety is not being used is that someone started the use of a 6-ft dish and a 10-ft dish and an 8-by-12 reflector, and we've been stuck with it ever since. This isn't necessarily the best thing for us. The antenna system, and by this I exclude high towers, is the cheapest part of a microwave system. Here is one area where you can obtain a lot of db gain with zero increase in maintenance. There are no tubes to change in an antenna or concentrator. I would like to reiterate, that a careful look at microwave design will bring out the fact that, in some cases, it may well pay to use concentrators of 28 ft or possibly larger sizes to prove-in an adequate link.

And while I am talking about cost and maintenance, I would like to make the strong statement that probably most of the manufacturers are missing a *real* good bet.

That bet is *G-LINE*. I have asked several microwave suppliers about this. *All* of them have said, and I quote, "I really have nothing against it—only we haven't used it before, and besides, what happens when it ices?"

In the first place, *nothing* happens when it ices, because you only lose 4 or 5 decibels during the melting period, and your built-in fade margin for summer fades has ample ability to cover this.

And for the reluctance to be first to try it—the pipeliners gambled with it and Texas Eastern over a year ago installed this G-LINE and we have had perfect results.

I believe that any user of comparatively high towers should take a long look at this device.

On the subject of stand-bys, we'll have no switching stand-bys. You either have zero stand-by or 100 per cent stand-by. By 100 per cent stand-by I mean dual transmitters and receivers both operating simultaneously. There will be no switching equipment and no alarms. What we need is a Volkswagen in the microwave field.

In many instances, these transistorized relay links will be of one audio channel only. It will be used for a telemetering or telecontrol channel, or a voice plus telecontrol channel in which narrow band voice and tones are used. No multiplexing equipment as such will be used. If high density equipment is required, you would fall back to the conventional type.

The terminals and drop-out points can be quite different. As long as highest quality components are used, you can install at those points all the gadgets that are required. But please remember that it is not the terminals that give us the trouble in the field and in actual operation. The trouble occurs and the trouble is costly, at the unattended repeater points. We want to be able to put them out in the woods and forget them. This *must take place* if private systems are to compete with other forms of communication.

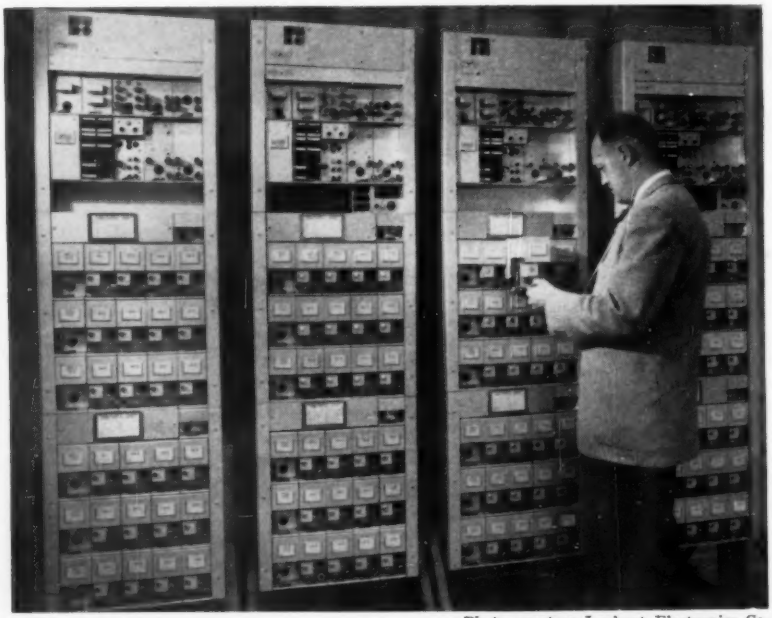

Photo courtesy Lenkurt Electronics Co.

A 48-channel terminal for microwave radio use.

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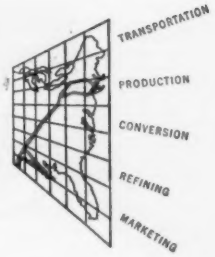

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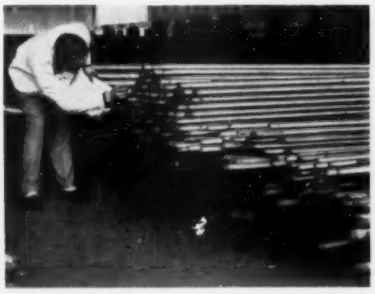

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What we need is 1925 broadcast transmitter type construction, with big tubes that loaf along on the job. And the tubes and components should be designed as common carrier builds its deep sea cable under water system—to last 20 years without replacement.

I wrote a paper back in 1955 which was published in a pipeline magazine. In that paper I made some pretty broad statements. I divided it into a number of axioms, most of which still hold true.

I gave as axiom number one, the statement that the least expensive part of an industrial microwave system is the radio equipment. The expensive things are the towers and the survey; and, particularly, the long-term cost of service in a multiplicity of stations. And I said that the fewer stations the better, almost regardless of tower height.

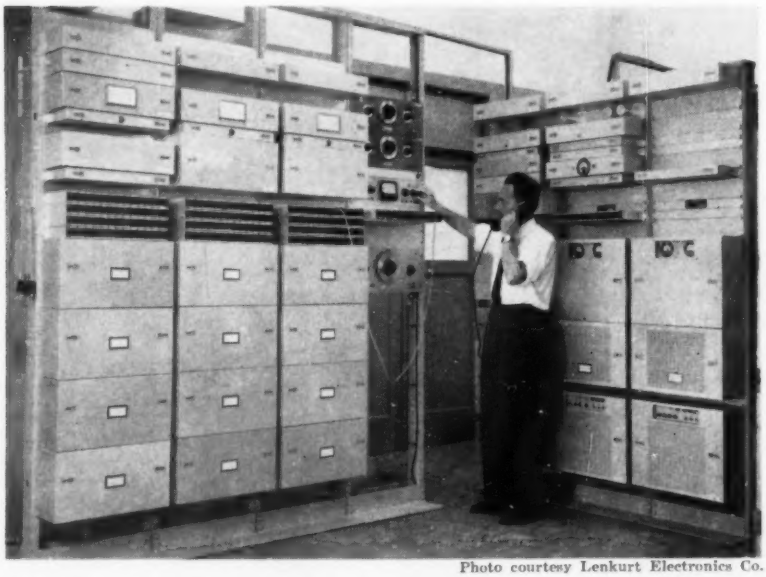

Photo courtesy Lenkurt Electronics Co.

This 24-channel, 900-MC terminal is part of a microwave system in operation on a Saudi Arabian pipeline.

Two years and four months after that statement, I have come to believe that the relay station towers should be limited to 170 ft in height and carefully spaced with fairly short paths to eliminate fading.

I gave at that time, axiom number two which said that anything in equipment design that would reduce the frequency of maintenance calls is well worthwhile regardless of electrical efficiency of the unit and, to an extent, regardless of initial cost. This still holds true because there are a lot of maintenance calls involved over a 10-year operating period of a system.

In axiom number three I made the blunt and rather bold statement that if the tower won't blow down, it is rigid enough. That still holds true. Some of the microwave equipment manufacturers try to hold the users down to a very rigid specification in which they say the azimuth weave should be almost nil with a 100-mile per hour wind or the system won't work and the performance guarantee is just no good. This can sometimes be a problem of 6000 megacycles and above, but it just ain't there on the lower frequencies. If the wind is blowing enough to wobble the tower and make the antennas weave to change the azimuth bearing, I would wager there is sufficient wind to break up any ducting effects that you might have. And if it does weave, the one-half power point, which is only 3 db, is negligible compared to the 40 db or more built-in fade margin which you must have for calm wind conditions. If the wind is calm, you start worrying about fades; if the wind is blowing, you can forget them.

I also made the statement that the ideal relay station is no relay station. But, if you must have one, build it to last. And if you are going to use high towers with tower lights and tower lighting alarms, and those other gimmicks, then put the high tower at an attended site such as a compressor station, industrial terminal, or some point where there will be someone around to see just what's going on. Don't put those high towers and other gimmicks way out in the woods.

In axiom four I said that many times it is simpler—and from a public relations standpoint, better—to have a local observer report tower light failure, if you must have tower lights, into headquarters. And there is an extra dividend here because if a local resident or farmer is available, these people of great integrity take pride in this duty and often act as a self-appointed guardian of the station involved.

In that paper, and again in this one, I come back to buildings. I also come back to my viewpoint that the best buildings are no buildings; particularly on an unattended relay station. They are of little value unless dust proof and ventilated by the pressure method or preferably by air conditioning. For simple relay stations, I do not believe that these buildings are necessary. Take the cost of the building and upgrade the equipment.

We can take a lesson from the electric utility companies because in their outdoor substations they place their transformers and switching equipment out in the open. They let the things sit there and stay. We could do the same thing with microwave stations.

The radio equipment can be mounted on outriggers bolted to the tower. The stand-by generator and/or batteries, if any, can be mounted on the concrete tower base, which is extended in the form of an apron in the desired direction. And you will have no problems of ventilation, heat or vibration. It means that there will be just one trip by the tower installation crews. They move in and erect the towers with the standard apron

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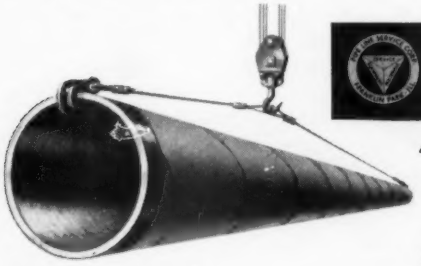

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slab and do not move back.

That brings me to another axiom I gave at that time which says do not come back to the job. Work it so that each crew completes its job in one trip to the site.

I made another statement which says that there is not much you can do about access roads except that they must be built to last a long time and they must be properly drained. If the station site requires an access road—which is a necessary evil—just make it a good one.

If you cannot tolerate outages of any kind then you, of course, would use dual receivers and dual transmitters. The transmitters are designed so that each of them will carry the path under no fade conditions. You will then gamble that one transmitter will remain operable during a deep fade. The law of probabilities will prove that this is feasible. However, I say that radio stand-by equipment, unless it is used as dual operation, is more trouble than it's worth if it's purchased as a preventive for outages. Its only value is to permit maintenance work without circuit interruption.

Looking ahead a little bit on pipeline microwave use, we will have to take notice of the advantages of closed-circuit TV transmission, which is admirably suited for transmission over microwave links. Conventional closed-circuits, high-definition equipment will be a valuable tool. And the slow-scan equipment, which can be transmitted over existing systems, will surely become common within the next year or so. One of the major gas pipeline companies at this time is constructing a remotely controlled reciprocating engine-powered compressor station which has been specifically designed so that information of the condition of the station could be transmitted by TV to the controlling point. All of the indicating meters and charts, and other information points, are grouped in one central location in such a manner that they can easily be scanned by either slow scan or high definition TV equipment. And, this is just the beginning.

Development of solid-state electronics, including transistors and ferrites, will in time greatly reduce or eliminate the number of vacuum tubes employed in pipeline microwave systems. More and more such ribbon-type installations will resemble the simple black boxes for which some of us in the petroleum and gas industries have been looking for for years. Another development which I include in a microwave discussion because it is what you might call very microwave or micro-microwave, is the art of infrared transmission. This will be similar to conventional microwave techniques except for the output stage which will be a hunk of glass which should give good transmission on short distances and would not present a radio interference problem such as now confronts the FCC. I don't doubt that we could transmit TV on links of this type as well as data handling and conventional voice transmission. This is a good method to get away from the radio spectrum as we now know it.

We would probably use infrared equipment, together with polished reinforced plastic reflectors, to give good point-to-point circuits. I believe that microwave manufacturers could well investigate this type of transmission to supplement the conventional microwave system.

We pipeline people have just begun to explore the advantages obtained by the use of microwave facilities. We will soon start employing the art of cybernetics in pipeline operation; the transmission of data information, telecontrol intelligence, and TV for operation supervision and management conferences. Right now we are in a position of having available a 10-ton truck and hauling on it one crate of oranges. We will have to carry many crates of oranges to really take advantage of these microwave facilities.

Gas industry communications people should accept the fact that we have the responsibility to convey and explain to our managements our knowledge that we cannot buy a cheap communication system which will stay put. We have to show them that there is more to the problem than price alone. That is our responsibility. The manufacturers' engineers want to build the best thing that they can build, if we the consumer, just give them the chance to build it for this service. We should write our specifications with this in mind. We should tell the manufacturers just what we want, and we should insist on specifications equal or better than joint Army/Navy or the highest commercial circuits.

The manufacturers should incorporate in their advertising the advantages to the customer of low maintenance communications systems and make this part of their selling program.

They must try to inform the consumers that they can't carry freight on a kiddie-car.

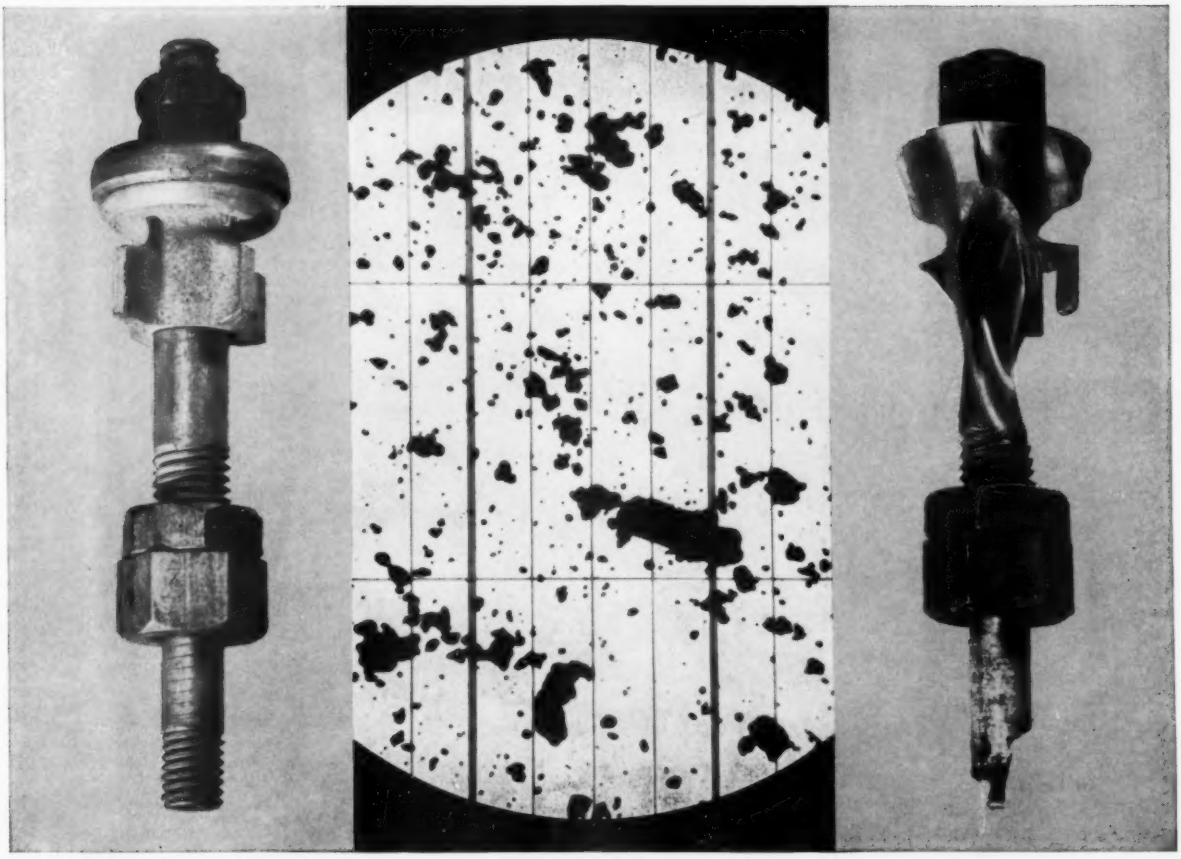
And the manufacturers should appeal to the consumer engineers to help carry this message to their management.

All of us must help broadcast the message: "Quality pays, it does not cost." ■

F. Vinton Long was born in Boca Raton, Fla., and was an amateur radio operator at the age of 12. He was with Pan American Airways, Gulf Oil Co. in South America, an Air Force communication officer, and later in sales engineering.

From 1950 to date he has served as head of communications and tele-control engineering for Texas Eastern. Mr. Long is a correspondence school engineering graduate, a senior member of the IRE, a member of the AIEE, the Society of American Military Engineers, and the Association for Applied Solar Energy. He is a registered professional engineer in Louisiana and Tennessee, and holds several patents pending on communication, solar furnace, and pipeline control devices.

This article is based on a talk presented at the WESCON meeting on Aug. 21, 1957, in San Francisco.



This regulator inner valve designed to control gas pressure with accuracy and dependability

handling gas with invisible dust that's revealed only by 40 power magnification

blasted by dust making the regulator inoperative, cutting off the town's gas supply

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An eroded regulator, a gas leak, a spark, a fire and a town without gas—it all started with gas that proved to be dirty.

This could have been prevented by the oil bath scrubbing action of a Blaw-Knox Gas Cleaner. And it's this fine, invisible dust that travels the easiest, farthest, causes the most damage and complaints. Only oil scrubbing can remove dust particles of small micron and sub-micron proportions. The width of one of the fine lines shown in the photomicrograph is one micron—0.000039 in.

Gas cleaned the Blaw-Knox way provides a trouble-free fuel that cuts your operating cost, and maintains customer satisfaction.

We would be pleased to recommend a Blaw-Knox cleaner to best meet your requirements. Just send us maximum hourly load, minimum pressure at peak and maximum pressure for which the cleaner should be designed.

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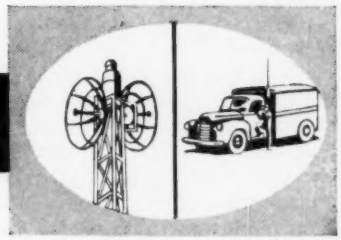


By FRANK CHAPMAN

FCC hearings reveal industry's plans for microwave

RECENT hearings before the Federal Communications Commission on the allocation of microwave frequencies have brought to light interesting statistics on the current and contemplated usage of microwave by the gas industry. The size and length of the industry's microwave plant has been estimated in several of the statements before the commission. Reference has also been made by several of the witnesses regarding the industry's future requirements for additional facilities and new services that are contemplated over microwave channels.

C. E. Upson, chairman of the AGA communications committee, in his statement before the FCC said, "Today the gas industry has installed and placed in operation approximately 11,000 route miles of microwave facilities providing approximately 76,000 channel miles of communication service." Regarding the industry's future use of microwave he made reference to a recent study of existing gas transmission systems which indicated the need for "between 26,000 and 39,000 additional route miles of microwave facilities to accommodate their requirements for the next ten years."

A somewhat larger estimate of the industry's future use of microwave was given in a statement by the Texas Illinois Natural Gas Pipeline Co. Using Upson's figures for current mileage, the Texas Illinois statement predicted that the industry will have "between 37,000 and 50,000 system miles of microwave by 1967."

The Texas Illinois figure was based on a projection of the seven-year growth of the gas industry's use of microwave which began in 1949. It refers solely to gas pipeline usage.

The most thorough analysis of current and contemplated usage of microwave was given in a statement by W. M. Rust, Jr., who appeared on behalf of the Central Committee on Radio Facilities of the API as chairman of a special committee to forecast petroleum radio usage. The Rust statement reported on a series of surveys which have been carried out by his committee since 1954.

The first survey of the series was made in 1954 at the request of the bureau of safety and special services of the FCC. It covered usage in 1954 and provided information for a five-year forecast. The survey tabulated 24 microwave operators, with 444 microwave stations and 834 transmitters. It reported 10,969 beam miles of microwave in use.

A breakdown showing the number of microwave channel miles in use according to type of service produced the following tabulation:

48,025 miles of microwave telephone service.

4,037 miles of microwave teletype service.

8,923 miles of microwave remote control service.

21,302 miles of microwave telemetering service.

10,119 miles of microwave VHF control service.

At that time (1954) six additional systems were under construction and eleven were in various stages of planning. It was predicted that the usage would double within the next five years.

Only two years later, in 1956, a second survey was made that proved the committee's five-year estimate far too conservative. The second survey reported 39 microwave operators, 730 microwave stations and a total of 17,026 beam miles of system. The industry's microwave plant had increased by more than 50% in the

Type of Service	Number of Companies	Channel Miles Minimum	Channel Miles Maximum
Closed Circuit TV	14	6,957	13,880
Facsimile Telephone	25	34,305	59,715
Telephone	80	351,525	613,287
Teletype	46	67,936	107,752
Telemetering	72	244,216	465,972
Data Processing	38	63,561	117,326
Supervisory Control	67	132,094	237,413
Alarm Signalling	41	68,905	124,441
VHF Control	61	52,119	89,918
Other	9	9,586	13,468

two years between 1954 and 1956.

A breakdown by type of service showed that telephone usage had more than doubled to 107,025 channel miles. Teletype service had increased threefold to 12,768 channel miles, and telemetering and remote control service had jumped to an estimated 77,000 channel miles.

The third in the series of surveys was designed to estimate the industry's microwave requirements by the year 1967. Questionnaires were sent to over 800 licensees in the Petroleum Radio Service and 263 positive replies were received. The replies included about 90% of the current microwave users with probably above 95% of the microwave mileage or stations. The committee termed the survey conservative on the basis of the continuation of the present eligibility rules and the current economic trends.

The table on page 133 shows the number of companies that expect to use the various types of service over microwave by 1967, and the estimated minimum and maximum channel miles that they contemplate will be in use:

Turning to the contemplated new applications for microwave by the industry, M. O. Sharpe, in a statement for the Central Committee on Radio Facilities of the API, said the committee "forsees widespread use of microwave systems in such vital applications in the petroleum industry as the control of entire plant operations, plant processes, remote well testing and operation . . . centralized data processing and inventory controls as well as the remote operation of complete pipe line systems."

Expanding on the latter point he said, "We can envisage the early advent of long, cross-country natural gas, oil and products pipe lines which are almost wholly automatically operated. The control of booster or compressor stations, gate valves, measuring stations, tank farms and similar functions by remote control will require an enormously expanded number of control channels. New equipments are currently being designed and produced to provide for such functions. . . ."

GAS pipeline news

El Paso answers antitrust charges

El Paso Natural is not going to take the Justice Department's antitrust suit lying down. In a strong, straight-forward answer, El Paso's Paul Kayser made it very plain that "El Paso and Pacific Northwest are both regulated by the FPC. No service may be inaugurated and, once commenced, no service may be abandoned without the permission of that agency. The price of gas purchased by the companies is controlled by the FPC and markets served are prescribed by certificates of convenience and necessity. The rates charged by the companies are strictly regulated."

Both El Paso and Pacific Northwest officials are confident that they have not run afoul of the Clayton Act. Unassociated legal minds in the nation's capital are predicting the El Paso-PacNorWest merger will be allowed to stand, virtually in its present form.

El Paso Natural has also: (1) approved filing with SEC of $130 million in new financing to be spent on current system expansion, and (2) made a major gas strike in Terrell County (Texas), through affiliated Western Natural Gas Co., that blew-in at an estimated 75 MMcf/-day. The well blew out, caught fire and destroyed the drilling rig, but was brought under control. Mr. Kayser termed it "of unquestionable major significance." Production from this discovery will be used to supplement present reserves.

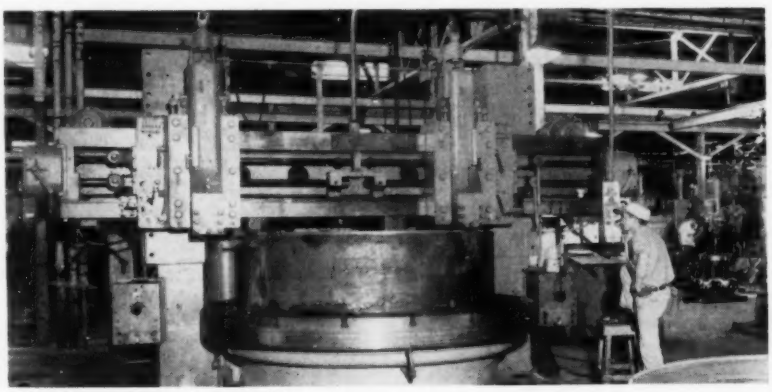
Ohio Fuel is building

Ohio Fuel Gas Co. (Columbus) will construct 37.7 miles of 24-in., 17.2 miles of 20-in., and install 3000 compressor station horsepower while retiring 4000 hp, following FPC authorization. Total cost of the projects will be $4.7-odd million. System capacity will be increased by 113 MMcf/day.

M-D expansion okayed

Following earlier temporary authorization, Montana-Dakota Utilities Co. (Minneapolis) has received FPC authorization to build: a 1980-hp compressor station at Dickinson, N. D.; 6.1 miles of 12.75-in. pipeline between Mandan and Bismark, N. D.; new pressure regulating stations to serve the two cities; a 4646-ft 6-in. lateral near Sidney, Mont., to render gas service to a company-owned steam electric generating plant; and metering and flow control facilities for the company's existing desulfurization and dehydration plant in Garland field, Big Horn county, Wyo.

J. B. Beaird Co., Shreveport, has added a giant—35,000-lb with 108-in. boring table—vertical boring mill to its tooling program. The mill is machining 6.5 ft diameter flanged, dished-head tank car ends, one of Beaird's several new products.



At the dispatching center of Shell's products pipeline general field office, Indianapolis, scheduler Robert Formby collects data from remote pumping stations.

Teletypewriters give Shell dispatcher immediate readings from four remote pumping stations

"New Douglas station suction 60 pounds, discharge 600 pounds, motor load 100 amps . . ." that's what the teletypewriters above tell Shell Oil Company's Indianapolis dispatcher about operations at an unattended pumping station over 200 miles away.

Bell System private line teletypewriters connect the dispatcher with four remote stations on Shell's "east line," which carries 33,000 barrels a day from the Wood River, Ill., refinery to Illinois, Indiana and Ohio markets.

The dispatcher simply pushes the proper buttons and the distant station is instantly on the circuit. Data on the remote operation is then received on his teletypewriter. By pushing other buttons, he can also start and stop pumps at the locations.

* * * *

Accuracy, reliability and speed are three reasons private line services are widely used in the pipeline industry. A Bell System representative will gladly give you more information, study your own requirements at no cost to you. Just call your Bell Telephone Company business office.

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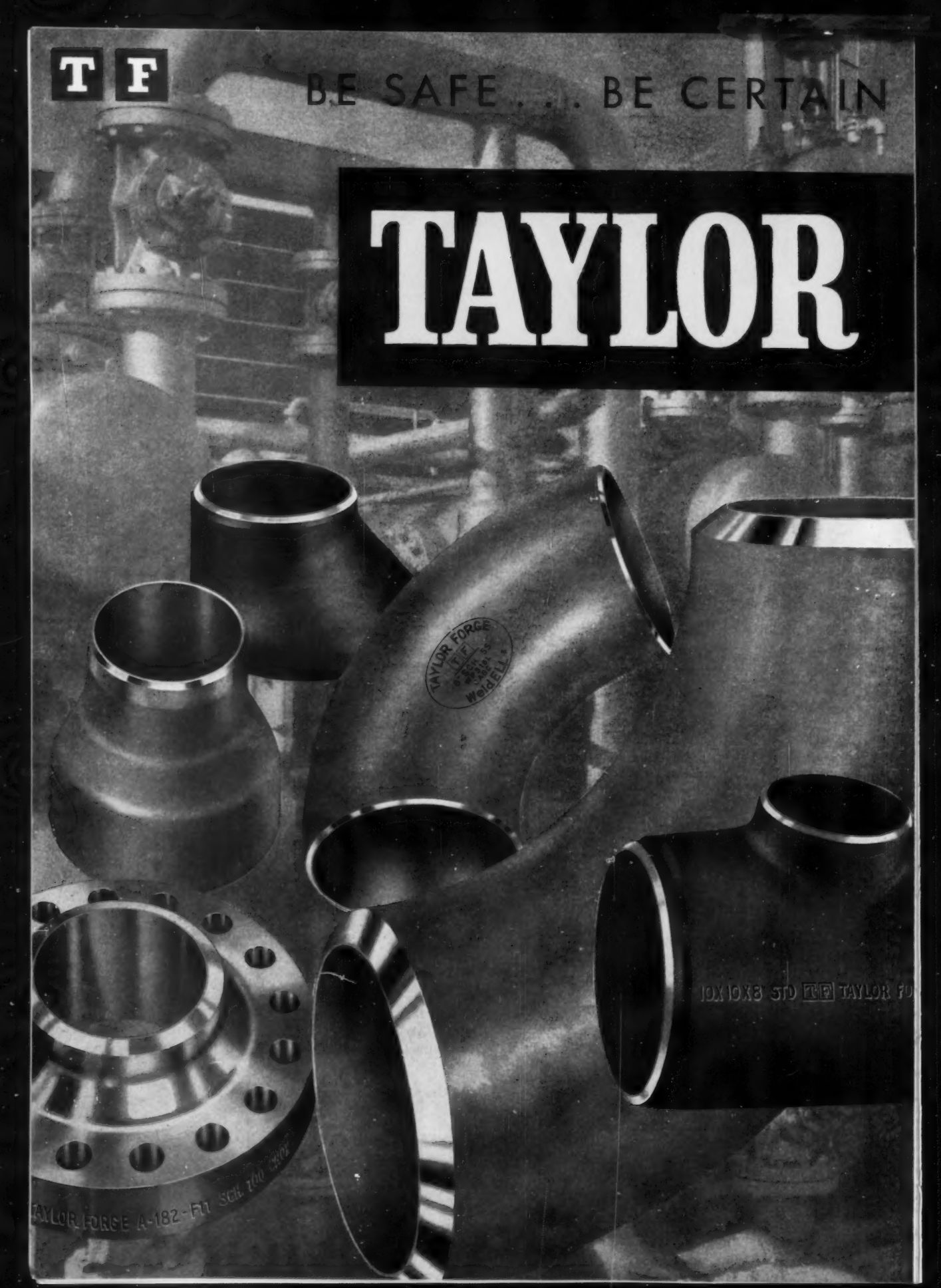
CHANNELS FOR: REMOTE METERING AND CONTROL • TELEPHOTOGRAPH • CLOSED CIRCUIT TV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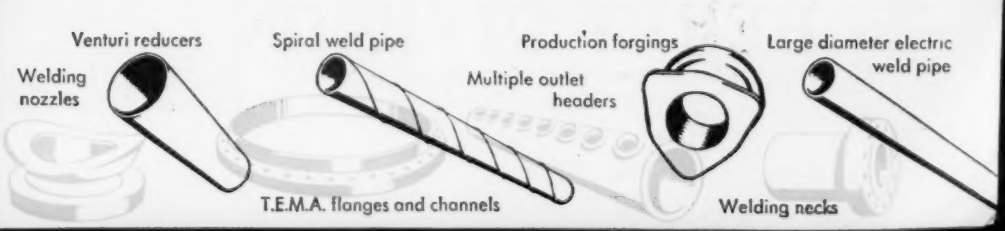

496
COST CUTTING CASE STUDY

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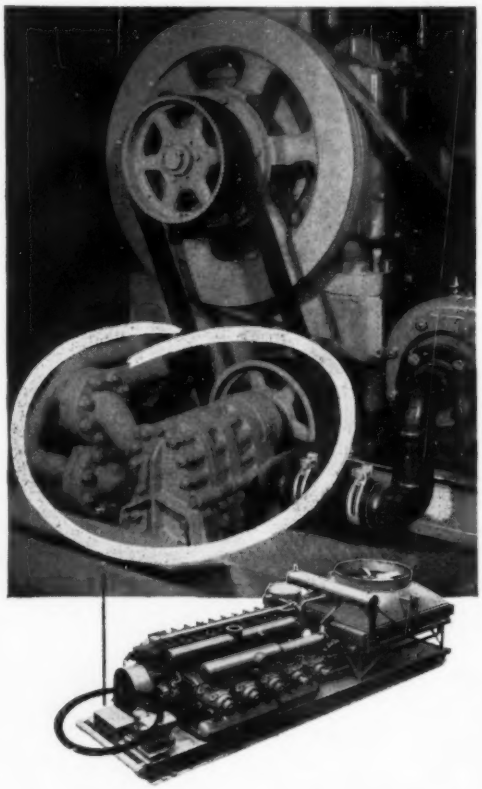

Berry drives give:

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- INFINITELY VARIABLE FAN SPEED
- FLEXIBLE FAN LOCATION
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- SIMPLIFIED POWER TRANSMISSION

These are the reasons Clark Bros., Inc. standardized on Berry Hydraulic Drives to run the direct mounted radiator fans on their portable, skidmounted HMA-B Compressors. They replace conventional belt drive and jack shaft. Clark finds that versatile Berry Drives give them greater latitude in locating the radiator fan. Their customers like the infinitely variable fan speed that can be changed to fit the cooling requirement. Since input horsepower is only that necessary to operate the fan under any given temperature condition, there is a saving in power during cooler weather. Proved too, are lower upkeep costs and longer component life resulting from the cushioning effect of fluid power.

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The advantages of Berry Hydraulic Drives can be translated into lower costs on *your* power transfer requirements. Economical and easy to install, Berry Hydraulic Pump/Motor Drives assure smooth, sure, foolproof power at infinitely variable speeds. They are quiet running with maximum power efficiency. And, you can depend on Berry Hydraulic Pump/Motor Drives!

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BB-8

pipeline news • *Cont'd.*

Other existing facilities may now be abandoned. Estimated cost of the construction will be $1.095 million.

Trunkline buys building site

Trunkline Gas Co. (Houston) purchased a five-acre tract in Houston as a site for a proposed new office building. The transmission company has its own very modern building in the southwest part of the gas-center city, but Trunkline's vice president, W. W. Prior, said —"We are presently planning the construction of a new building which will provide more office space and parking space for the Houston office." No date has been set for the start of construction.

Trunkline's pipeline takes Rio Grande Valley (Texas) area natural gas to central Illinois.

Engineers get a look at engine's inside action

Adding radioactive materials to lubricating oil is giving research engineers at Cooper-Bessemer Corp. a minute-to-minute look into the inside action of modern high-compression engines. Evaluation tests that took 100 hr running time are now done in a few minutes.

Ralph Boyer, CB's vice president and director of engineering, points

Research with radioactive oil tells instantly what goes on inside engines built at Cooper-Bessemer Corp.'s Mt. Vernon, Ohio, plant.

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RCA Microwave Radio Systems are designed with future needs in mind. They do not face obsolescence because of users' growth. High channel capacity permits orderly growth up to a total of 120 channels for voice, data transmission, supervisory control and other purposes.

RCA was one of the earliest pioneers in the development of microwave for commercial communications. Today, RCA Microwave Systems provide users throughout the world with many important features . . . operation in the most advantageous frequency bands, simplified installation and minimum maintenance cost.

Serving their users with dependability and precision, RCA Microwave Systems are now operated by utilities, gas and petroleum pipelines, cross country turnpikes, and government agencies.

More than a million channel miles of RCA Microwave Systems in service . . . performance proved throughout the world.

RCA Microwave specialists will be glad to answer any questions and help plan your installation. Mail coupon for further particulars.

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Ask about the RCA "Package Expansion Plan" which confirms your wise choice of RCA CW-20 or MM-26 Microwave for your communications system. A minor field modification will bring your system up to 48, 72 or even 96 channel capacity, depending on your revised requirements.

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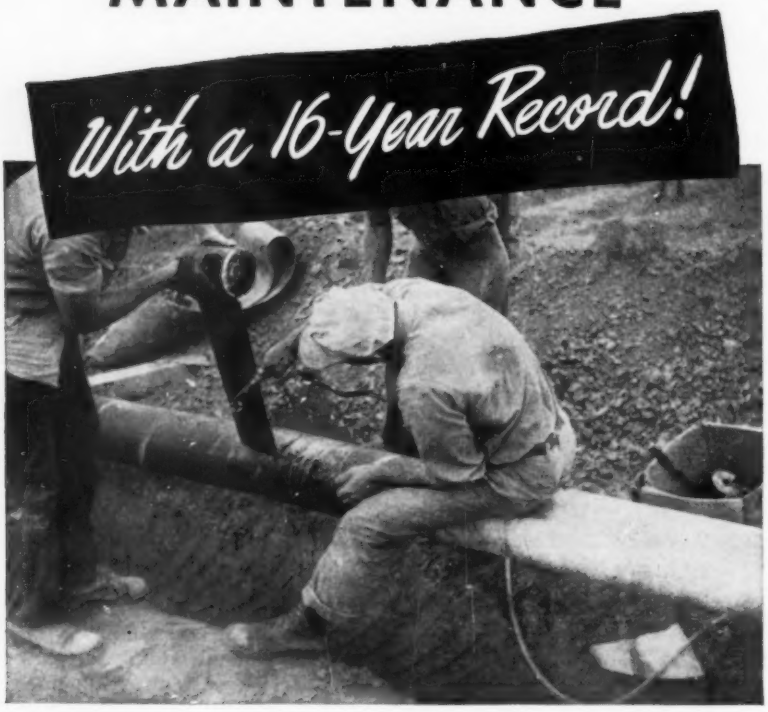

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TAPECOAT comes in rolls of 2″, 3″, 4″, 6″, 18″ and 24″ widths. Also available in asphalt. Find out today how it can fit into your preventive maintenance program and help you save time, labor, material and money.

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pipeline news • *Cont'd.*

out that the new engine "basal-matabolism" method answers questions such as: at what point do piston rings actually seat? This is vital to pipeline compressor station costs and maintenance. Operators are inclined, through urgency, to put the engines on full load before piston rings are seated. The radioactive lube oil research program now permits Cooper-Bessemer to recommend—with reasonable ceretainty—the earliest period when engines can be fully loaded without risk of scoring or premature wear to rings and cylinder liners.

Battelle Institute and Cooper-Bessemer cooperatively developed the research technique. The object was to define quantity of radioactive materials to provide valid recordings. And effect of radioactives in polluting engine exhaust had to be evaluated.

The new research tool will greatly cut time and cost in development of new metals for pistons, rings and cylinder liners for future use in tomorrow's supercharged diesel, gas, and gas-diesel engines, that will operate with higher and higher cylinder pressures.

Big plans for more gas for California

At least three projects are being planned or proposed to bring additional natural gas reserves to insatiable-looking California markets. The latest is an El Paso Natural-SoCal & SoCounties arrangement that will have El Paso delivering Canadian gas (100 MMcf/d by September '59 and up to 200 MMcf/d by September '60). Routed via the Pacific Northwest system, a new El Paso line will take-off gas from the *Scenic Inch* at Twin Falls, Idaho. The new line will be a 500-mile, 34-in. OD run to the Nevada-California border, southwest of Las Vegas. The southern California companies will take delivery at the state line. Pipeline to move the Canadian gas to the Los Angles basin will have to be built. The gas will be pipelined a full 2200 miles from Canada to the Los Angeles area. The agreements and construction plans have to be authorized by state and federal regulatory bodies.

Earlier (See GAS, August, '57, P. 8), PG&E announced its proposed new Canada - to - California pipeline. Its wholly owned subsidiary, Alberta & Southern Transmission Co., has lined up large nat-

This 125 cfm Gyro-Flo Compressor and PB-8 Paving Breaker combination is making short work of a heavy pavement job in a large Eastern city.

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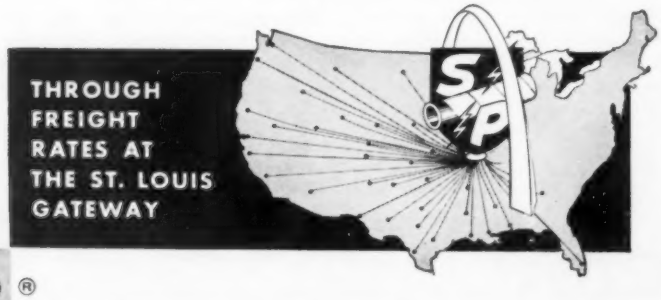

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ural gas reserves in the Alberta foothills fields and is dickering for more. Alberta gas companies—Canadian Western and Northwestern Utilities—are helping and may participate in the reserves-production phase. The line will be some 1300 miles of big-inch pipe from the Whitecourt, Alberta region to Antioch, Calif. It is designed to deliver 400 MMcf/d when it goes into operation in 1960—if plans and construction are approved by several regulatory groups in both nations. The southern California companies have been offered half of the line's capacity.

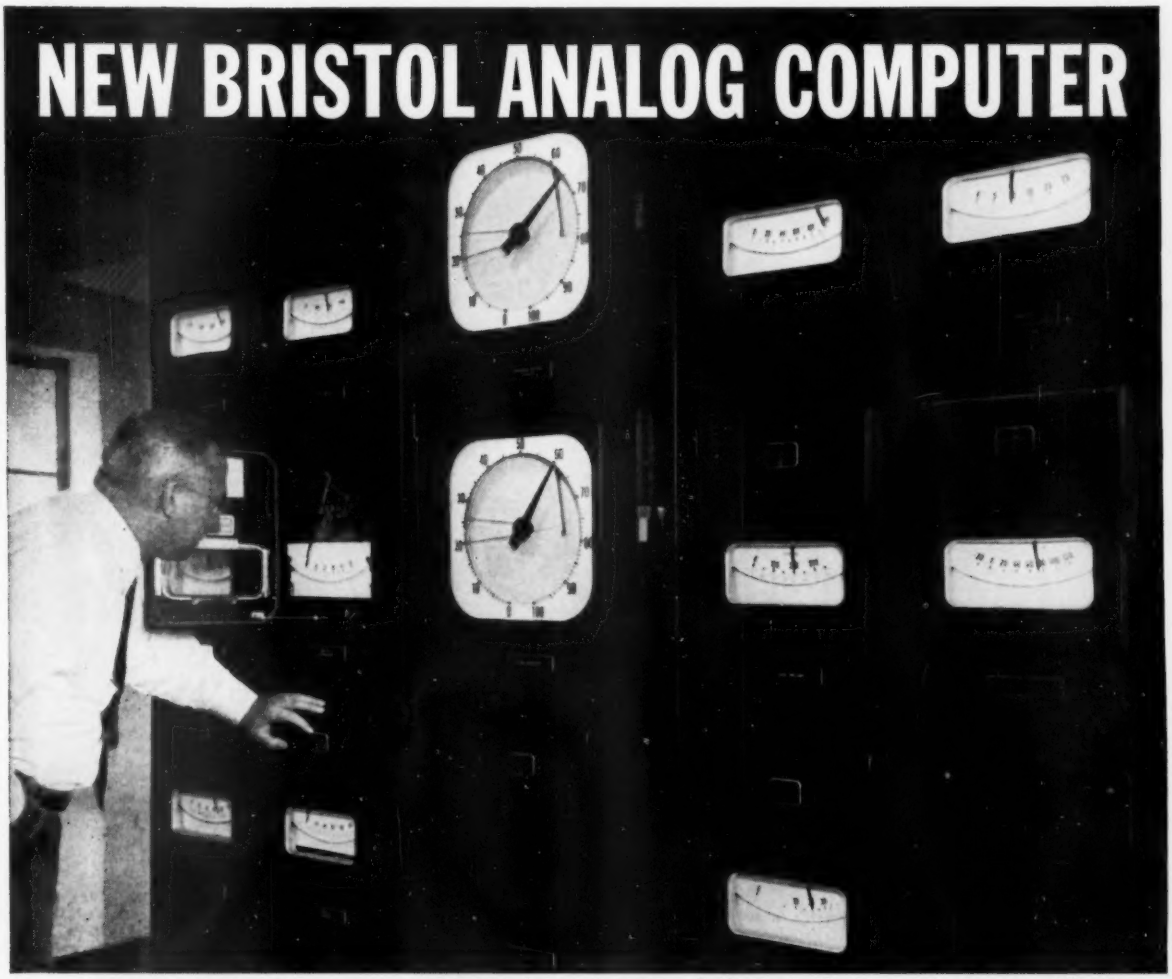
Still another natural gas pipeline project is headed—in the planning stage—for California. Warren Petroleum Corp., Monterey Oil Co., and J. R. Butler (Houston consultant) propose to construct a big natural-gasser taking production from the Four Corners play to the Nevada-California state line. Resale there would be to either a large industrial consumer (perhaps Southern California Edison Co.) or to Southern California and Southern Counties gas companies. Or, the sale may be direct to a consumer with SoCal-SoCounties transporting it from the state border to the LA Basin. Project is known as Trans-Western Pipe Line Co. It too must see the FPC for a certificate.

PG&E currently receives about 750 MMcf/d of out-of-state gas from El Paso. This will be upped to 875 MMcf/d by the end of this year, and to 1025 MMcf/d by 1959. With 200 MMcf/d available from the Cal-Can (new Canadian) pipeline in 1960—if that is in the cards—their out-of-state take will be at least 1225 MMcf/d during 1960. Another 100 billion cu ft, more or less, per year—not day—may be available from California fields.

By the end of August of this year, Southern California-Southern Counties will be receiving 955 MMcf/d of out-of-state natural gas from the El Paso system. And El Paso Natural has an application to supply an additional 75 MMcf/d in FPC right now. Thus, if the Canadian gas delivery by El Paso becomes a reality, the out-of-state deliveries to the southern part of California will total about 1230 MMcf/d within the next three years. And, this does not bring the curtain down on interest in the 200 MMcf/d that could be available from the PG&E Canadian line.

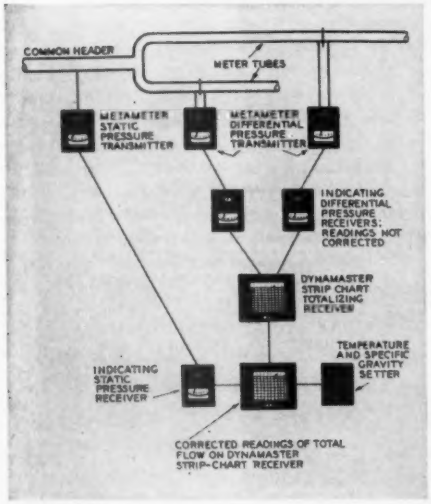
Total out-of-state natural gas

NEW BRISTOL ANALOG COMPUTER



BRISTOL COMPUTING TELEMETER EQUIPMENT in metering station, Public Service Electric and Gas Company of New Jersey.

Variables entered automatically and continuously by telemetry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INDICATING STATIC PRESSURE RECEIVER
CORRECTED READINGS OF TOTAL FLOW ON DYNAMASTER STRIP-CHART RECEIVER

SIMPLIFIED SCHEMATIC of new Bristol computing telemeter system. Actual instruments can be miles apart.

Totalize flow through any number of pipelines . . . **Compute and apply corrections** for static pressure, temperature, specific gravity, supercompressability, as required. Various basic orifice flow factors can be electrically inserted into the electronic computing circuit by switch selection . . . **Indicate, record, or read out corrected flow** (or any other variables) at centralized or remote stations.

This outstanding Bristol development is already in use on natural gas and steam distribution systems by the country's largest utilities and distribution companies, including Public Service Electric and Gas Company of New Jersey, Consolidated Edison Co. of New York, United Gas Improvement Co. of Philadelphia, Central Hudson Gas & Electric Corporation, and others.

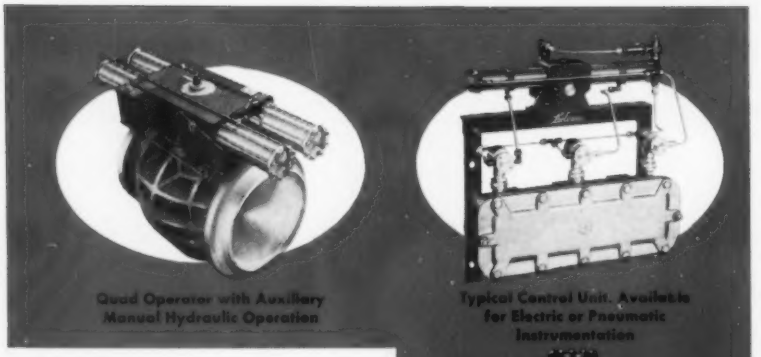
It supplies complete, accurate, continuous information to the gas dispatcher. With data both on trends in gas load and cumulative total consumption at his fingertips, the dispatcher can operate closer than ever before to contracted load limits, while still avoiding high penalty rates. *In most cases, the instrument-computed totals come within 0.4 to 1% of billing meter totals.*

Find out how this latest Bristol development can step up efficiency and cut cost on your distribution or transmission system. The new computer is adaptable to distribution of any gas or liquid, including: artificial and natural gas, water, oil, gasoline, steam, air, solutions of various kinds, ammonia, brine, etc. Write to: The Bristol Company, 119 Bristol Road, Waterbury 20, Conn.

7.24

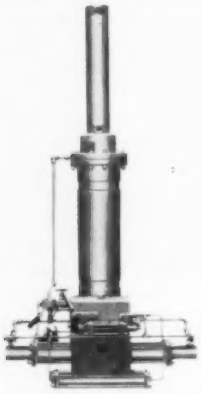
BRISTOL TRAIL-BLAZERS IN PROCESS AUTOMATION

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

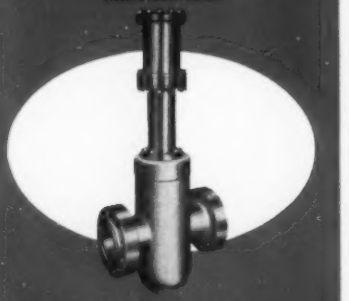

Quad Operator with Auxiliary Manual Hydraulic Operation

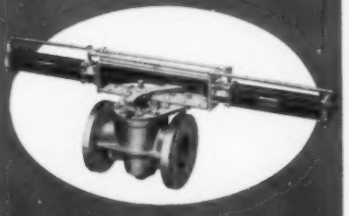
Typical Control Unit. Available for Electric or Pneumatic Instrumentation

Ledeen
VALVE OPERATORS and CONTROLS
FOR THE GAS INDUSTRY


Main Line Gate Valve Operator and Controls

Whether you require automatic operation for gate valves or plug valves—1" to 36"—write or call Ledeen—manufacturers of one of the most complete lines of valve operators and controls available to the gas industry. Ask for engineered recommendations for your requirements.


High Pressure Gate Valve Operator


Tandem Operator for Medium Size Plug Valves

Operator for Small Size Plug Valves

Ledeen MFG. CO.

3334 No. Gilman Road
El Monte, California

•

CUmberland 3-3163

WRITE FOR BULLETIN 3020

pipeline news • *Cont'd.*

flowing into California during 1960 may be 2.455 billion cfd, or even 2.655 billion cfd.

Corrosion short course breaks national records

The second annual Appalachian underground corrosion short course broke all national attendance records for corrosion short courses, according to J. H. Royston of Royston Laboratories Inc., Blawnox, Pa.

More than 450 attended the meeting held on the campus of West Virginia University in Morgantown. The school was under the auspices of the University's School of Mines and was backed by the AGA and NACE.

During the school, the general committee met and elected the following members to serve on various committees: C. A. Erickson, Peoples Natural Gas Co., general chairman; R. M. Keller, Atlantic Pipe Line Co., program chairman; Charles Dey, Koppers Co., co-chairman, program committee; R. E. Hanna Jr., West Virginia University, secretary-treasurer; M. P. Ellis, Pittsburgh Coke & Chemical Co., exhibits committee chairman; A. H. McClain, University of West Virginia, co-chairman, exhibits committee; George F. Orr, Hill-Hubbell & Co., publications committee chairman; and J. H. Royston, Royston Laboratories, publicity committee chairman.

FPC issues '56 report

The Federal Power Commission reports that 107 pipeline companies were in operation during 1956. Their general classification "natural gas pipeline company" includes companies having transmission line mileage greater than 250 miles and sales for resale in excess of 50 per cent of total sales. Gas operating revenues of the pipeline companies were $2,120,033,000, a 12.7 per cent increase over 1955. Sales by the pipeliners were 7.43 trillion cu ft. Both statistics are for 1956.

Montana's microwave system 70% complete

Seventy per cent of Montana Power Co.'s new microwave communications system is completed.

Work is under way on the west leg, to Hamilton, Missoula, and Kerr dam. The east leg, to Billings,

USER BENEFIT No. 5

VERSATILITY

got GARRETT RELIEF VALVES

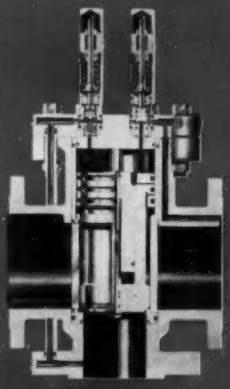
Look the field over and you'll not find another valve that offers as much as the Garrett Relief Valve.

First, there's unequalled accuracy and dependability, obtained by placing opening and closing functions in two controls that are entirely independent of each other. The differential-area design allows a pressure-opened, pressure-closed main plunger that is free of the inconsistencies present when a large, stiff spring is used.

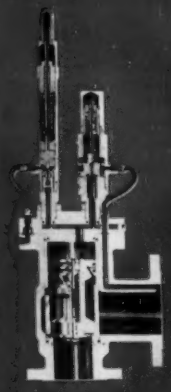
Secondly, the Garrett Valve may be used as a blowdown valve without affecting its function as a relief valve. Through the addition of a simple Garrett "operator," a solenoid valve or other suitable control, it can be opened manually from a remote location, or tied into an automatic safety shut-down system. This versatile valve can be applied to almost any piping layout. And of great importance to present users, existing Garrett Valves may be equipped for remote control or safety shut-down without even taking them out of the line!

For a complete explanation of these and other reasons why Garrett Valves have become "standard" on so many transmission and distribution systems, contact your nearest Garrett representative or write for Bulletin No. RV-103.

REPRESENTATIVES THROUGHOUT THE UNITED STATES AND ABROAD



Garrett Type "D" Relief Valve. Sizes, 1" through 8", single or dual outlets, for working pressures from 150 to 5000 psi. Supplied with soft or hard seats, screwed or flanged connections.



Garrett Type "E" Relief Valve. Sizes, 1" through 8", for working pressures from 25 to 200 psi. Soft or hard seats, screwed or flanged connections.

Garrett Oil Tools, Inc.
P. O. BOX 2427 • LONGVIEW, TEXAS

DIVISION OF [illegible] INDUSTRIES, INC

will be started next spring. The north phase, to Canada and points in between, is already in operation.

In other work on its system, the Butte-based company has started on an extension to the Missoula transmission line which will permit service to six communities and a paper plant. The 8-in. line will serve Clinton, Piltzville, Bonner, Milltown, West Riverside, and East Missoula.

Twenty-six miles of line to gather gas at company wells in the Pedant d'Oreille and Comrey fields in southeastern Alberta are also being laid. In addition, 7.5 miles of 8-in. line is being added to Montana Power's system at Telstad, near Cut Bank.

Garrett Oil Tools Inc., Longview, Texas, has opened a new, modern plant at Longview. The U.S. Industries Inc. division plant is located on a 40-acre tract. Building space totals 86,000 sq ft and allowance has been made for possible expansion to some 491,000 sq ft.

Transco sets new high

Transcontinental Gas Pipeline Corp. (Houston) established new highs for the second quarter and for the 12 months ended June 30, '57. And they anticipate receiving authorization to complete construction during the year to 970 MMcf/d, plus 136 MMcf/d available from present storage.

GAS pipeline notes

Citizens Gas Co. (Tuscola, Ill.) is seeking order directing Panhandle Eastern Pipe Line Co. (Kansas City) to sell and deliver gas for Hammond, Ill., and environs.

United Fuel Gas Co. (Charleston, W. Va.) will not be permitted to charge two affiliates—Ohio Fuel Gas Co. (Columbus, Ohio) and Manufacturers Light & Heat Co. (Pittsburgh)—lower summer gas storage rates than other customers are charged under contract demand rates.

Southern Natural Gas Co. (Birmingham) has been authorized to build pipeline facilities to bring ad-

GET THE FACTS..

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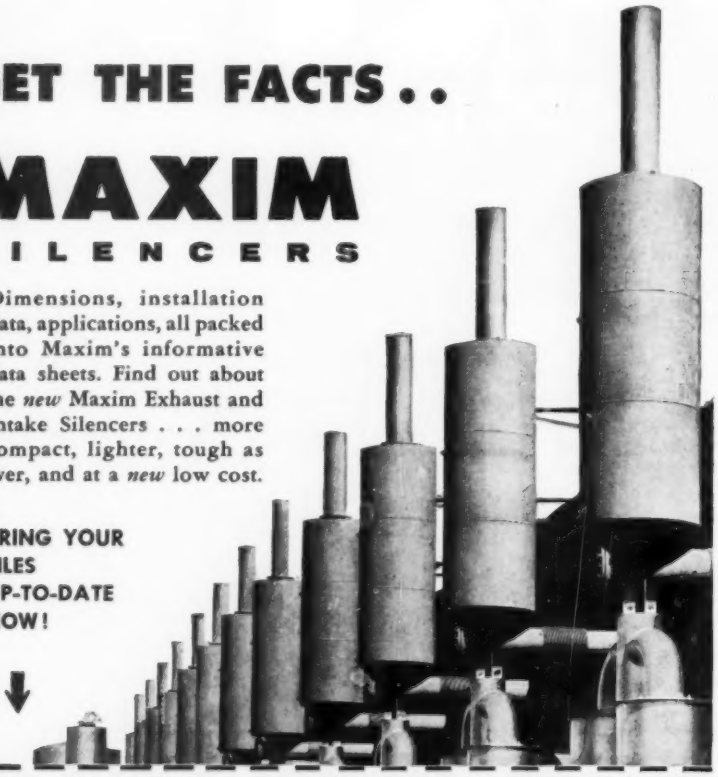
SILENCERS

Dimensions, installation data, applications, all packed into Maxim's informative data sheets. Find out about the *new* Maxim Exhaust and Intake Silencers . . . more compact, lighter, tough as ever, and at a *new* low cost.

BRING YOUR FILES UP-TO-DATE NOW!



THE MAXIM SILENCER COMPANY

Subsidiary of Emhart Manufacturing Company

95 Homestead Ave., Hartford, Conn.

Gentlemen: Please send bulletins on silencers for:

☐ WASTE HEAT RECOVERY

☐ INTERNAL COMBUSTION AND STEAM ENGINE EXHAUST AND INTAKE

☐ AIR COMPRESSOR INTAKES AND DISCHARGES

☐ VACUUM PUMP DISCHARGES

☐ BLOWER INTAKES AND DISCHARGES

☐ STEAM, AIR OR GAS DISCHARGES

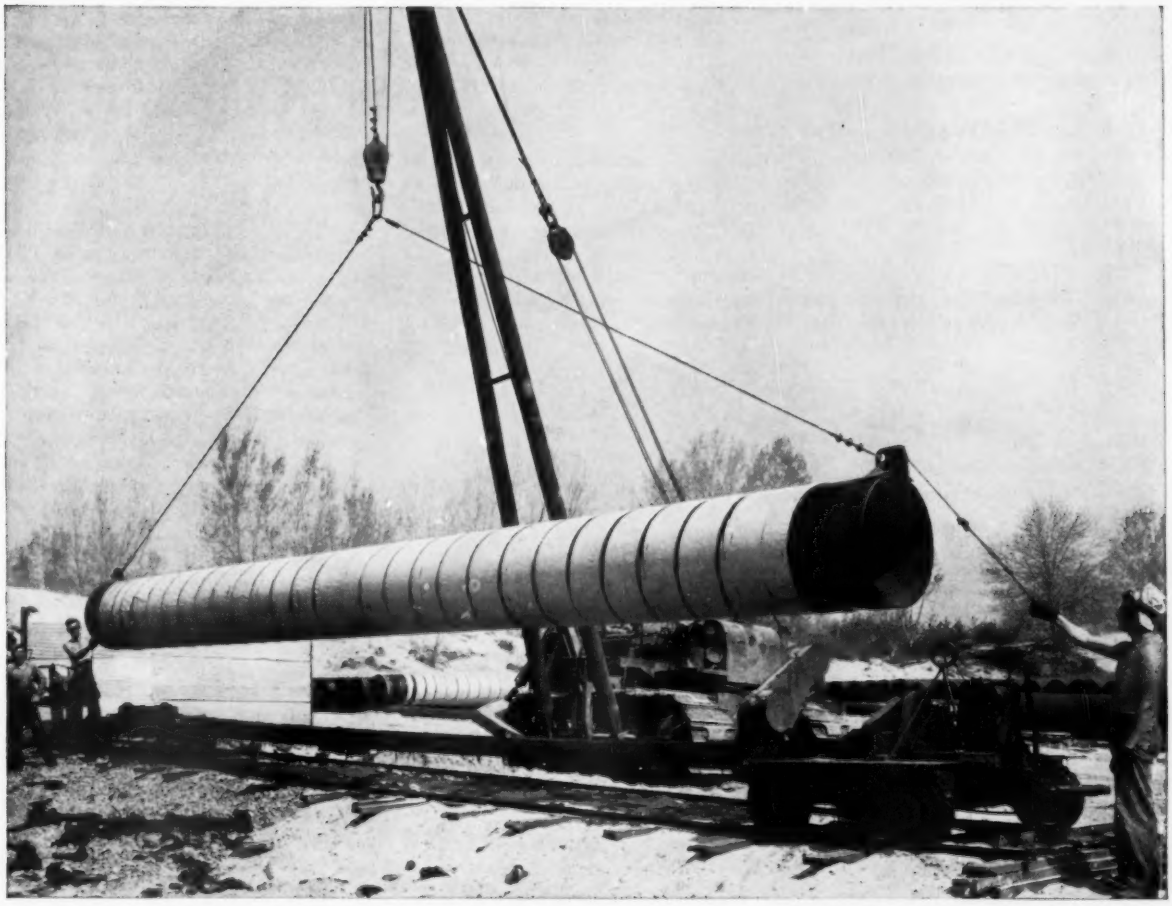
☐ JET AIRPLANE ENGINE EXHAUST AND INTAKE

NAME _____

COMPANY _____

ADDRESS _____

_____



ANOTHER LINK IN A MILLION-MILE CHAIN

This 30-foot section of pipe has been coated, wrapped, and is ready for service. It will take its place in the vast underground pipeline network that moves a greater volume than do trucks, railroads, ships and planes, combined.

It will become part of a great subterranean system that is vital to America's everyday living.

Let the facts speak for themselves. The gas industry alone handles over 10,000,000,000,000 cubic feet daily through more than half a million miles of transmission and distribution pipelines. A 185,000-mile pipeline system moves liquid petroleum products across the continent. In addition, there are many thousands of separate pipeline systems used to transport steam for power and heating —and to deliver water through municipal piping.

But there are problems—and one of the most important of these is corrosion. Pipeline companies and utilities must protect their metal pipe against the many corrosive elements that exist underground.

That's where Dearborn comes in. Dearborn's complete line of NO-OX-ID Coatings and NO-OX-IDized Wrappers provide both chemical and mechanical protection against moisture penetration and soil action—protection that lasts for decades—under ground or under water. That's why leading pipeline companies and utilities everywhere look to Dearborn for long-term protection against corrosion leaks and deterioration.

We will gladly consult with your engineers on the best NO-OX-ID Coating and Wrapper Combination for your next pipeline job.

SPECIFY

Dearborn NO-OX-ID®

ON YOUR NEXT PIPELINE JOB

USE THE COUPON FOR MORE INFORMATION

Dearborn Chemical Company, Dept. G-NO
Merchandise Mart Plaza, Chicago 54, Ill.

☐ Please send details on NO-OX-ID Combinations.
☐ Have representative call.

Name.....*Title*.....

Company.....

Address.....

City.....*Zone*.....*State*.....

ditional Louisiana and offshore gas reserves to its system.

Trunkline Gas Co. (Houston) has been directed to serve the cities of Clinton, LaCenter, Bardwell, and Wickliffe, all in Kentucky, if no review is initiated before FPC by Aug. 15.

And Texas Gas Transmission has been ordered to serve Central City, Ky., with up to about 2 MMcf/d.

United Gas Pipeline Co. (Shreveport) is seeking authority to construct and operate pipeline and facilities to provide direct interruptible industrial service in Mississippi.

Texas Eastern Transmission Corp. (Shreveport) and La Gloria Oil & Gas Co. (Corpus Christi, Tex.) are affiliating; the latter is an oil and gas producer with one of the nation's most modern refineries and one of the nation's largest gas processing plants—both in Texas.

Tennessee Gas Transmission Co., Union Oil & Gas Corp. of Louisiana, and Lion Oil Division of Monsanto Chemical Co., (all of Houston) and Murphy Corp. (El Dorado, Ark.) have closed their deal for the 900,000-acre Bolivian concession formerly held by Houston oilman Glenn McCarthy.

To simplify billing and increase economies, two subsidiaries of The Peoples Gas Light & Coke Co. (Chicago) are asking that one, Texas-Illinois Natural Gas Pipeline Co., be allowed to sell all of its gas to the other, Natural Gas Pipeline Company of America, and the latter would in turn resell this gas to present Texas-Illinois customers and so be the sole selling agent to all utility customers served by the Peoples Gas system.

The Newark, N. J. sales and service staff of the Bristol Co. (Waterbury, Conn.) moved into new headquarters at 744 Broad St. R. C. Bechert is branch manager.

Southern Union Gas Co. (Dallas) is ready to start construction of a new suppy line between Lovington and Hobbs (N. M.).

Clark Bros. Co. (Olean, N. Y.) has opened a new office and warehouse facility at 800 Central Expressway, New Orleans, La.

Pacific Northwest Pipeline Corp. (Salt Lake City) will seek permission this fall to supply natural gas to five cities in Idaho. The towns will be served by either Citizens Utilities Co. or Shoshone Natural Gas Co., whichever is successful in securing state and municipal authorizations.

The U. S. Senate's Committee on Commerce approved Jerome K. Kuykendall for another five-year term as a member of the Federal Power Commission. Washington observers feel the floor test in the Senate will be close.

On the international gas industry front, Fish Engineering Corp., Fish Northwest Constructors Inc. and North American Utility and Construction Corp. will build a 815-mile Bolivian natural gas pipeline to bring gas from Campo Duran fields to Buenos Aires. The new line will be owned by YPF, the government's gas and oil monopoly. The contract involves $200 million, including an additional crude oil job.

Stability

KEY FIELD PERSONNEL

Form a Permanent Part of Our Organization

Houston
CONTRACTING COMPANY
GENERAL CONTRACTORS
Laurence H. Favrot • R. P. Gregory • Geo. A. Peterkin

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GASOLINE
WATER PIPE LINES

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HOUSTON 6, TEXAS

OIL AND GAS TRANSMISSION LINES

Youngstown electric weld line pipe provides safe passage for oil and gas through America's important transmission lines

Pipe lines that transport gas and oil to our metropolitan consumption centers are most vital to America's future. Because these important carriers must give dependable around-the-clock service all-year-long, leading Pipeliners specify Youngstown Pipe for its: Easy bending, uniform wall thickness, excellent line-up characteristics, outstanding weldability and longer lengths. Thus, lines are laid faster and easier.

QUALITY YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Producers of Carbon, Alloy and Yoloy Steels

General Offices - Youngstown 1, Ohio

District Sales Offices in Principal Cities

GAS pipeline people

Several appointments have been announced by Texas Gas Transmission Corp., Owensboro, Ky. E. F. HINDMAN is superintendent of the pipeline department. He is succeeded as manager of the company's Louisiana division by W. O. DAVIS. And, EDWARD HAMRIC becomes the pipeline department's assistant superintendent. Both Mr. Davis and Mr. Hamric have been assistants to the pipeline superintendent.

Edward Hamric
Texas Gas

E. F. Hindman
Texas Gas

W. O. Davis
Texas Gas

Fulton Copp
Pacific

JOHN MACKINNON has been named director of J. B. Beaird Co.'s new product research and development division. Mr. MacKinnon has been administrative assistant to R. W. Keer, vice president of American Machine & Foundry Co. Beaird has also announced the election of JOHN L. TULLIS, vice president of sales, to vice president and assistant general manager.

ALFRED T. KROOK has joined Bechtel as a vice president of Bechtel Corp. and vice president of Bechtel International Corp. and Canadian Bechtel Ltd.

CARL G. DANIELSON, formerly with Midwestern Engine & Equipment Co., has been named manager of the Houston Branch of Midwestern Pipe Line Products Co.

M. R. SHEHYN is now supervisor of advertising and market development for the Consolidated Western Steel division of United States Steel. Formerly a staff assistant, Mr. Shehyn is now responsible for coordinating on a division-wide basis the advertising and market development functions of the sales department.

Several appointments have been made by Pacific Northwest Pipeline Corp., Salt Lake City. New chief engineer is PAUL F. MCBRIDE, who has been acting chief engineer for several months. FULTON W. COPP, formerly manager of rates and sales, was elected vice president of sales. WILLIAM G. CUTLER is manager of production operations and reservoir engineering department, replacing L. G. TRUBY, JR., who was recently named general manager of production. T. A. DUGAN is now division manager of Pacific's operations in the San Juan basin.

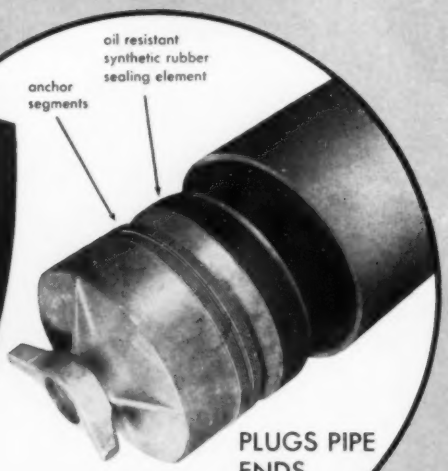
ARTHUR R. ERICKSON has been named exploration manager for Northern Natural Gas Producing Co. He formerly was chief geologist.

It's easy to...

- Propel Pigs by Compressed Air
- Test Piping

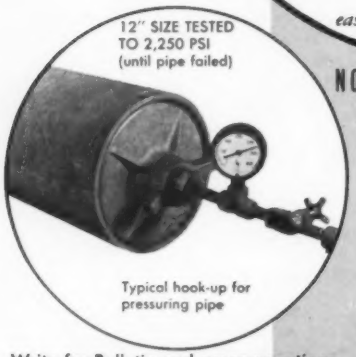
with the . . .

IMPROVED Wm SON WEDGE-LOCK PIPE PLUG



Sizes: 3" to 14"

PLUGS PIPE ENDS TEMPORARILY
easily installed & removed



NOTE THESE IMPROVEMENTS:

- ★ Each size seals in greater range of pipe ID's
- ★ Independent anchor segments insure uniform grip inside pipe
- ★ Large bypass hole through center
- ★ Rugged sealing element
- ★ Permanent dry film lubrication

Write for Bulletin and pressure ratings

T.D. Williamson, Inc.
P. O. BOX 4038 TULSA 9, OKLAHOMA
REPRESENTATIVES: HOUSTON • AMARILLO • PITTSBURGH • PLAINFIELD, N.J. • JOLIET, ILL. • JACKSON, MICH. • LOS ANGELES • SAN FRANCISCO BARTLESVILLE, OKLA. • SEATTLE • EDMONTON • TORONTO • WINNIPEG VANCOUVER • BUENOS AIRES • CABIMAS, ZULIA, VENEZUELA DURBAN, NATAL, SOUTH AFRICA • PARIS, FRANCE • SIDNEY, AUSTRALIA

HYDRANTS FOR PLANT PROTECTION

Types and sizes for every requirement

YOU'LL be ahead on many counts when you specify modern Darling Fire Hydrants. Just for example . . .

Your system can include hydrant types exactly right for special or unusual service needs — breakable coupling types where traffic damage is common, concealed flush types for airport and pavement installation, Tee-base types to eliminate lateral connections where practicable. These and a few of the other types are shown here.

Equally important, Darling's unique B-50-B development (now available in all except the Tropical type) introduces *ball-bearing* operation combined with "O" ring seals. Result: a packless, dry-top hydrant. No packing gland maintenance. Operating threads and bearings *stay* lubricated and water can't reach them. Operation is far easier, far faster . . . and you avoid lots of maintenance time and trouble.

Send for complete information. Better still, ask to have a Darling engineer check your needs and tell you just what you stand to gain with Darling Hydrants.

TRADE DARLING MARK

DARLING VALVE & MANUFACTURING CO.

Williamsport 26, Pa.

Manufactured in Canada by The Canada Valve & Hydrant Co., Ltd., Brantford 7, Ont.

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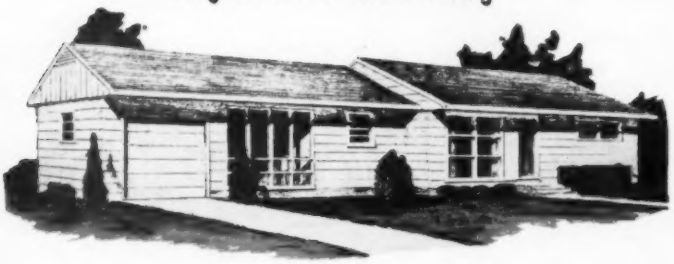
Designed for Gracious Living



Luxury Look with Economy

This home is made up of standard STURDYBILT sections, prefabricated at the factory. With the breezeway, utility and comfort is added. STURDYBILT Prefabricated homes with a luxury look can be economically erected on your site. Write for information.

STURDYBILT PREFABRICATED, DEMOUNTABLE HOUSES

SOUTHERN MILL & MANUFACTURING CO. • TULSA, OKLAHOMA

STURDYBILT HOUSES COMPLY WITH COMMERCIAL STANDARD CS125 OF THE NATIONAL BUREAU OF STANDARDS FOR PREFABRICATED HOMES

PIPE LINE HALF SOLES

SLEEVES

ON THE JOB CONSTRUCTION

CONCRETE RIVER WEIGHTS

One of the many Edwards Concrete River Weights installations on Texas-Illinois Natural Gas Pipeline.

Edwards Split Welding Sleeves also used on the line to insure perfect joints in swamps, rivers and safety zones.

PIPE LINE, REFINERY & GASOLINE PLANT EQUIPMENT ENGINEERS

Allan Edwards, Inc.

2445 S. Jackson — P. O. Box 7218
Tulsa, Oklahoma
Phones: DI. 3-7184 - DI. 3-8390

pipeline people • *Cont'd.*

Joseph Plourde
Northern

Fred C. Koch
Northern

FRED C. KOCH, Wichita oilman, has been elected a member of the board of directors of Northern Natural Gas Co., Omaha. Northern Natural has appointed JOSEPH C. PLOURDE assistant treasurer. Mr. Plourde most recently was manager of the public utilities research division of the National Securities & Research Corp. of New York.

EVERETT H. DEBRUHL is eastern regional field engineering manager for the ElectroData division of Burroughs Corp.

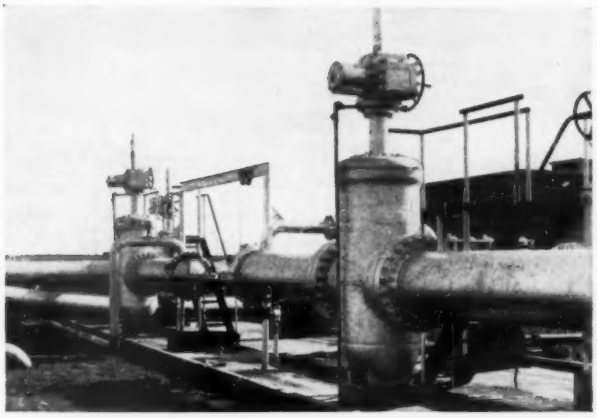
WARREN POND has joined Trunkline Gas Co. as Houston district landman. Prior to joining Trunkline, Mr. Pond worked five years for Gulf Oil Corp. in Houston and later in Midland.

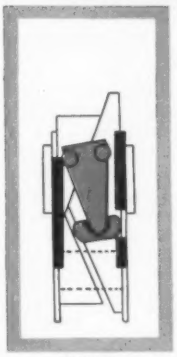
Two applications engineers have been promoted by Bristol Co., Waterbury, Conn. WALTER E. RUFLETH is manager of telemetering system applications and KENNETH R. NEALE is manager of electronic products applications.

MILFORD H. LUTTRELL is general sales manager of the Walworth Co. He joined the company in 1933, became assistant manager of the southeastern division in 1944 and manager in 1949.

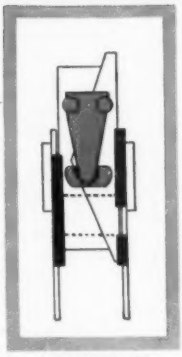
VROMAN W. RILEY is now district sales manager of the central area for Motorola's microwave and industrial control products department. He will be responsible for sales management in an area bounded by the Dakotas, Nebraska, Missouri, Kentucky and Ohio.

FREDERICK M. ASPEY succeeds the late Fred W. Ames as district manager of the southwest district of the Consolidated Western Steel division of U. S. Steel. He will headquarter in Phoenix.

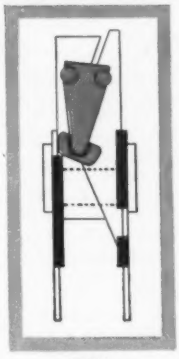




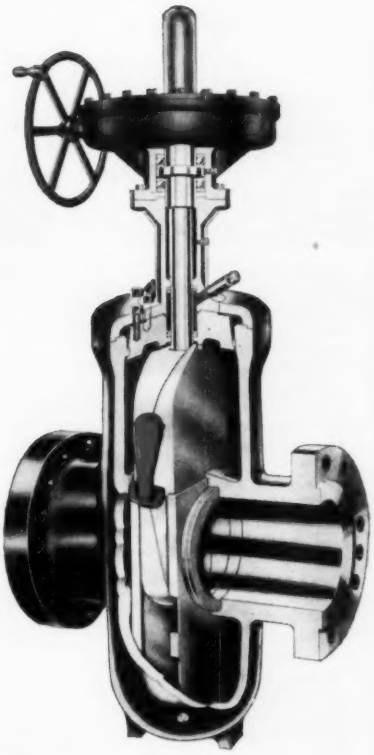
CLOSED POSITION



INTERMEDIATE POSITION



OPEN POSITION



You Get Free and Easy Opening and Closing in

W-K-M LEVERLOCK* GATE VALVES

You never have trouble opening or closing, even the largest W-K-M® Pipeline Valve, against any pressure, in any service condition.

The exclusive centralizing mechanism found only in Leverlock Valves is the answer. This positive-acting mechanical device holds the gate and segment in a collapsed position so there is no tendency to wedge while valve is being opened or closed.

W-K-M Gate Valves give you longer service with less maintenance. They are your best valve investment for all pipeline services—in sizes 2" through 34" (Sizes 6" and larger are Leverlock Valves), ASA 300 lbs. to ASA 900 lbs. Sizes 2" through 12" are available through supply stores.

*TRADEMARK OF ACF INDUSTRIES, INCORPORATED.

Other features that make W-K-M Valves leaders in pipeline service—

• Parallel Expanding Gate provides controlled force seating — upstream, downstream. • Through-Conduit assures full volume, free flow with no turbulence — no pressure drop — free passage of scrapers. • Renewable Seats — may be installed while the valve is in the line. • Pressure seal bonnet, seals tighter as pressure increases. • Superfinished stems — Enclosed packing box — seat lubrication.

W-K-M
DIVISION OF ACF INDUSTRIES INCORPORATED

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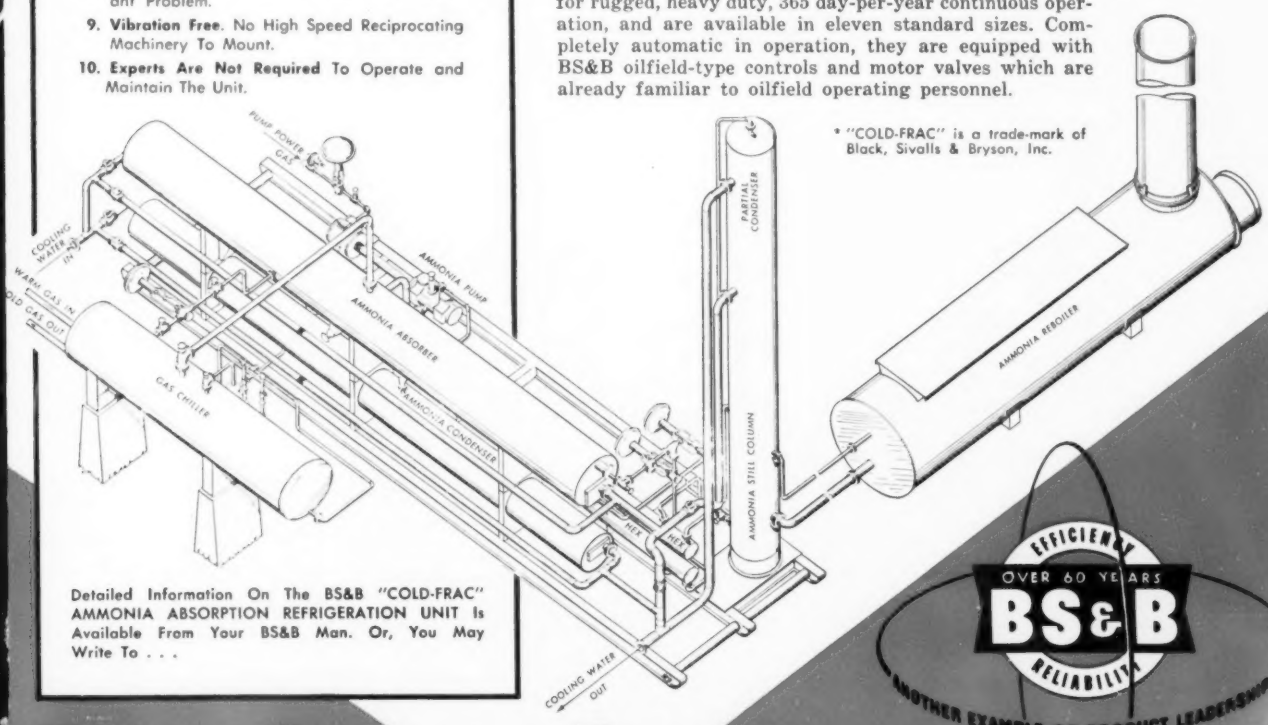

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